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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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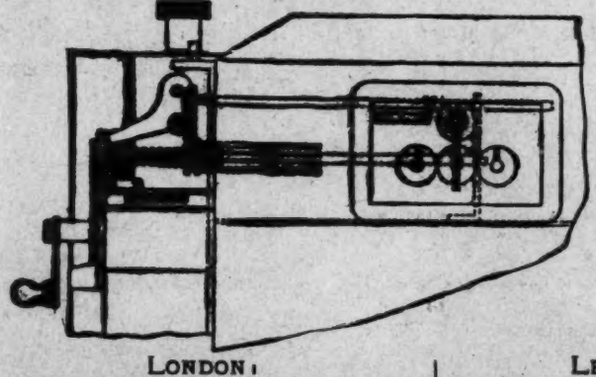

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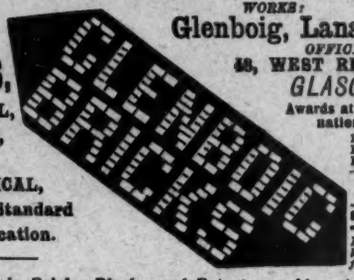

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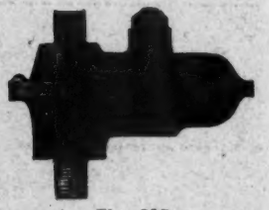

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VOL. CXXXIX., No. 2834] TUESDAY, SEPTEMBER 4, 1917. [69TH YEAR.

EDITORIAL NOTES.

Leaders Want a Lead.

ACCORDING to "Punch's" cartoon last week, the Kaiser, after reading the reminiscences of Mr. James W. Gerard, late United States Ambassador in Berlin, is represented as saying, "I never saw such an abominable tissue of de-"liberate truths." That is very much the position of the recognized leaders of the gas industry, who are not leading in the matter of the revision of gas finance and dividends. They admit the "tissue of deliberate truths" that compose the case for revision; but they plead a *cul de sac* and a *non possumus* condition. They cannot get farther. Someone is wanted who is not a recognized leader to give them a lead. As "Oikonomia" said in our "Correspondence" columns last week: "If the South does not move, the North will." Something must be done, for the position is going from bad to worse; and the gas industry of all industries is the only one that is working under such deplorably strange conditions. It may be and is true, as Mr. Charles Hunt said in his letter last week, that there are still sliding-scale companies that are paying their standard dividends. How long they are going to do so is another question. But whoever, when fixing the low standard dividends, thought that they would be subject to a 5s. income-tax, and such menaces as now exist! It is equally true that there is gas capital to the tune of several millions that is not receiving its standard dividend, and the dividend that it does receive is further curtailed by the heavy income-tax; and the fact is doing no good to the future financial interests of the industry. It is these sliding-scale and maximum priced companies who, through their own legislative and other conditions, need from Parliament relief from the financial consequences of the weight of unpremeditated influences—the concession granted to them being such that others can come in as their conditions send them flying farther along the dismal road the end of which no one can assert is in sight.

In a recent article, it was pointed out that gas proprietors are becoming restless over the continual shrinkage of their dividends. More business and smaller profits, owing to the heavier expenses, which promise to become still heavier, suggest to the practical mind of the outside man of business that there is something wrong. Something is wrong in two directions. It is in the first place clear that, in view of the low and unfair gas-trading dividends that are being paid in these times of heavy taxation and reduced purchasing power of money, gas and the other commodities of the industry are practically everywhere being sold at below what, at the present outlay for materials and labour, with other costs, is a fair commercial price. The gas man who has been accustomed to purveying gas at 2s. or 2s. 6d. need not to-day stand aghast at the thought of 1s. to 1s. 6d. increases. All the old conditions have been so overwhelmed by the new that penny and twopenny changes in price have been definitely abandoned as being altogether out of keeping with modern requirements. These are topsy-turvy times, and must be dealt with as such. The second direction in which something is wrong is in the gas industry being legislatively tied to a return upon its capital which was defined under conditions that have completely disappeared, largely owing to the weight and force of those which have come into existence through the war. In other words, the gas industry is to-day suffering very seriously from its own commendable pre-war virtue, which other industries—fortunately for themselves in these times—took good care not to emulate.

The voice of discontent and an appeal for action were again heard at the meeting of the Wandsworth, Wimbledon, and Epsom Gas Company on Tuesday last; and the speeches of Mr. W. Allard (who, we believe, is a Director of the Kingston-on-Thames Gas Company), and of Mr. J. E. Allen, together with the fact that Mr. H. E. Jones, the President of the National Gas Council, was in the chair, imparted to the meeting a character and an interest quite out of the ordinary. The Company is one whose pre-war conditions equipped it better than any other southern gas company for meeting the war-created *débâcle;* and the dividends that are being paid for last half year are good as things go, though, of course, of relatively greatly diminished value considering the weight of the income-tax and the lightness of the purchasing power. But when the speech of the Chairman is read, it will be seen that he admits the necessity of a further rise in the price of gas this half year, owing to the facts that, despite a large increase of business, the undivided balance, and an appropriation from the reserve fund, have been required to pay the dividend declared, and there are known additional expenditures for the current half year that will make thousands of pounds difference to the outgoings. And has the peak of war expenditure yet been reached? The railway men are asking for an addition of £1 per week to their wages; the miners are demanding a 25 p.ct. advance on current remuneration. He would be a bold man who said positively that the gas industry has seen the worst; and the position to-day is very bad. Yet Mr. Hunt said in his letter last week, "Have we yet the materials on which to base an "application?"—that is, for a revision of the sliding-scale. We reply with the questions: Have we the materials yet that are making investors in the gas industry discontented? Have we knowledge yet of the "materials" that have caused the market values of gas shares and stocks to descend to where they are to-day? Have we the materials yet that are causing the financial reputation of the gas industry to decline? When are we going to have the materials, if we have not got them now? And if we have not got them now, we shall not have them after the war. But Mr. Jones, the President of the National Gas Council, asks the shareholder critic to tell him what he would suggest they should do in the way of trying to produce some alleviation of the situation. He admits there is no exaggeration in the presentment of the current position; the facts are there, too large and too tightly established to have their existence denied. "But what can we do?" in effect asks the President. "It "is all very well to criticize, but what would you suggest "should be done?" Now let us put to him the inquiry as to whether the wells of initiation among the leaders of the gas industry are so dried up that those in and about London should themselves require guidance, and should so consistently plead a *cul de sac* and a *non possumus* condition?

What have the National Gas Council done in the matter? Have they seriously and resolutely taken it in hand, as a National Council, not as a Metropolitan one? Has a strong deputation representative of the whole private enterprise in the gas-supply industry been to the Board of Trade or Parliament through a deputation to members? Has the whole position been fully put forward in the right quarters? Mr. Jones, from the information that he possessed as President of the National Gas Council, stated at the Wandsworth meeting that "one member" of the Council had been to see the Board of Trade about the matter. One member! That does not strike us—however eminent the member—as being a thorough or very effective mode of handling a question of such supreme gravity to the gas industry. The member was told that it would be necessary to examine into the conditions of every gas company before making a change, and, therefore, the question would have to be deferred until after the

war. The pressure of work in the department is urged. We are not convinced as to the validity of the excuse. Special committees have been appointed, special departments have already been formed, and special means have been devised and adopted with the view of dealing with extraordinary circumstances arising from the war. Would it be such a terribly difficult thing, under the extraordinary conditions of the gas industry, for Parliament to permit it, subject to conditions, to suspend the operation of the sliding-scale, at an agreed point in respect of dividend, for the period of the war and a time after, until that point is again passed through the easing of conditions in regard to price? Meantime, the matter of permanent revision could also be set in train, instead of leaving the preliminaries until after the war, when, as Mr. Allard says, there will be a congestion of work to be overtaken, and when the position of the industry for receiving attention may be worse than now. The danger of delay is greater than that of perseverance. There is another matter bearing upon the request of the President of the National Gas Council for suggestions. Has he not seen, and have the Council not deliberated over, any ideas that have emanated from the North? If so, what is the result of the consideration? And have the Council put these alternatives before the Board of Trade, with a detailed statement of the grounds on which the request is made for relief that will save the capital of the industry from further depreciation? If not, why not? The matter must be seriously taken in hand. We can hardly think that any Government Department, when it finds an essential industry suffering from unmerited oppression, will not stir a hand or lift a finger or set brains to work, in order to see whether something ameliorating cannot be done.

A point that Mr. Jones made we freely admit. It is that it has been pleaded time and again that, on the faith of the sliding-scale, investors have embarked capital in the gas industry, and that therefore the standard price ought not to be "reduced." It follows, from this contention, as expressed by Mr. Jones, that, if there is an upheaval which entirely destroys the basis of the sliding-scale, there should be revision so as to ensure that the value of the capital is not unduly depreciated, and that it maintains a fair earning power. If investors thought there was no protection in this way, they would in the future carefully give the gas industry the go-by when looking round for a source of investment.

Preparing for Industrial Research.

IN another part of the "JOURNAL" is given (together with some extracts of special interest to our readers) a summary of the second annual report of the Committee of the Privy Council for Scientific and Industrial Research; and there is in it a great deal of interest to the men of an industry the expansion and progress of which are wholly dependent upon the revelations of research. The gas industry got as far as it could by empirical methods; but it came to a stage when all its empirical gropings would not carry it any farther, and, had it not recognized this, the chances are that there would have been regression from sheer inability to present a front in conformity with the higher standards which progress in other directions had set. However, the men of an industry that has been rescued by research, and that holds within it so much promise for the future by the aid of scientific exploration, must follow with interest the developments and the doings of a Department founded under the wing of the Government, and financed by it, the functions of which are exclusively devoted to the development and co-ordination of research in manner which shall prove of the utmost advantage to the country, and, therefore, to its industries and people. At the head and front of the aims of the Department is the establishment of research on a permanent basis; and a study of the present report promotes conviction that the Department and its Advisory Council are going about the work in the practical manner which will ensure the attainment of the objective. The report also indicates that there is no intention of wasting the funds that have been placed at the disposal of the Department, but that care will be exercised in the expenditure, so that nationally we shall secure the best return for the outlay. This is what would be expected from a mere glance at the names of the men who are actively associated with this work, and who are mostly men whose scientific attainments are well balanced by their knowledge of industrial and commercial affairs. That is as things should be. The man who lives in the higher realms of science, and has no association with applied science, is not much good for such work as this.

The direction in which the Department hopes to accomplish the larger part of its work is through the establishment of "Trade Research Associations," to which organizations grants will be made. The technical organizations of the gas industry should scrutinize very carefully the scheme of such associations, about which copious information is given in the appendices to the report. Where co-operation between manufacturing firms is not possible, where problems are complex, or where they immediately concern the consumer rather than the producer, there will be altogether different treatment. Fuel is an excellent illustration of this. Hence the establishment of the Fuel Research Board, under the directorship of Sir George Beilby, F.R.S., whose services are being rendered to the country quite gratuitously, as are those likewise of his fellow-members of the Research Board. But such work as is being done by the Board, it is not intended shall relieve from voluntary financial and other assistance the industries that benefit from the work, though naturally a large part of the expense should come from national funds, seeing that, as the Advisory Council truly remark, every home is interested in fuel economy, and so should contribute through the taxes to the cost of research. Such a research cannot be taken up by a single industry; for fuel use penetrates everywhere and under a great variety of circumstances, some of which are interlinked and interactive, though the industries concerned may be disunited. As one example, the gas industry stands at the very opening of work in the economic handling and treatment of coal; and from it should be drawn the fuel—solid and gaseous—for steam-raising and for many industrial heating processes. Proper investigation, however, should be made of the most economical methods of utilizing the fuels that the gas industry supplies; and those industries that use these fuels, as well as the industry that supplies them, should undoubtedly do a material part in aiding the work of the Board. This is expected; for we read that the Board "hope to receive "assistance, if not contributions, from some of the indus- "tries more immediately concerned." Incidentally, it may be remarked, the expectation also applies to illuminating engineering.

Although the Fuel Research Board have not up to the present time got beyond the preliminary work of thinking-out and mapping-out their course of action, sufficient is seen to show that it will be of far-reaching importance, and have distinct and far-reaching effects. The Advisory Council, it is clear, intends the whole Department to be the servant of the nation; and one way in which this ambition can best be achieved is to act as counsellors where scientific guidance is required by Government Departments. Many problems come before such Departments which they are not qualified to scientifically handle—such as the one referring to the composition of town gas, having regard to the requirements of the day, which are not—though Government Departments have thought they are—bound up solely with calorific value. They claim regard for flame temperature, which has relation (among other factors) to the constitution of the gas. This matter the Board of Fuel Research have in hand. As they proceed with their survey in this and other directions, it is patent that at every turn fresh openings will be found for their energies, the application of their knowledge, and the employment of a large retinue of scientific workers, who will not be allowed to follow precedents in relation to a masterly bureaucratic inactivity.

Mention is made in the report of work along other lines—such as domestic heating and atmospheric pollution; and in this connection there is a passage which signifies much to the gas industry. "The collection and tabulation of "careful records as to atmospheric pollution in different "parts of the country should be extended after the war; "and the statistics should supply in the future one of the "means of gauging the work done by the Fuel Research "Board in promoting methods of smokeless combustion." The degree of the assistance rendered to the gas industry in putting into their mains a fuel gas on as economical terms as possible, and the simultaneous inducement to the public and industries to use coke, will greatly contribute to this method of assessing the value of the work of the Board, and will add to the indebtedness of the industry to them. The help that has so far been rendered to the gas industry by the Advisory Council in connection with the research into refractory materials is much appreciated, as will be the encouraging reference to the subject in the report.

The Low-Temperature and Tar Production Muddle.

IT may now be said with a fair amount of confidence that the gas profession will hear little (if anything) more of the request for carbonization at low temperatures, unless it be in the shape of reproach for the want of sagacity in circulating a plan not only suicidal to gas undertakings, but one that, through the curtailment of carbonizing power, would have had a reducing instead of a supplementing effect upon the production of the required creosote oils. From more than one source, the Department from which emanated, as a tentative proposal, the idea of lowering carbonizing temperatures have received information which has (as in our issues for Aug. 21 and 28 it was intimated would be the case) conclusively proved to them that their plan would, in the resulting bulk of fuel oils, have fallen far short of its anticipated productive glory, and that the extra yield of fuel oils per ton of coal carbonized would have been, when the cost of the losses had been paid, a ruinous procedure. The experiment at some gas-works was carried just far enough to give a salutary satisfaction as to the overall inefficacy and expensiveness of the low-temperature project. To-day, in our "Correspondence" columns Mr. J. E. Blundell, of Macclesfield (this is only one among similar suggestions that have reached us), inquires whether "it is not due to the gas profes-"sion that they should now be informed of the reasons why "such a drastic proposal was put forward without proper "consideration?" Perhaps, however, it would be kinder not to press the matter. It is obvious that, as we said only last week, someone has blundered; and the fact will have a healthy effect on future recommendations, which will doubtless be more critically examined from all points before being fathered.

The question referred to is not the only point in Mr. Blundell's communication. He shows what would have happened in his case had he reduced his make to 9000 c.ft. per ton as compared with his present procedure, using vertical retorts, and steaming at the rear end of the charge. No low-temperature process working at the 9000 c.ft. stage could have beaten his production of tar per ton of coal carbonized; and what would have happened to it in total volume is conveyed by the figures that he presents. The figures also tell a tale of the disastrous consequences that would have befallen the gas supply of Macclesfield, including the probability of the undertaking, without a large amount of State support, being hurled headlong into a condition of insolvency. We need not specifically quote the figures he gives. They are so remarkable that their close acquaintance is sure to be sought by our readers. There is only one comment that need be made; and it is that our correspondent (through adopting Prof. Lewes's figures as a standard as to probabilities, which figures were obtained from plant specially constructed for low-temperature working) has been, if anything, modest in his estimates as to effects upon his make—that is to say, judging from Mr. John West's temperatures, throughputs, and results as given in the "JOURNAL" last week. With Prof. Lewes's temperature for 9000 c.ft. of gas per ton, it would probably require, according to Mr. West's results, about three times the plant to equal what Mr. Blundell is now doing. However that may be, on Prof. Lewes's estimates, Mr. Blundell shows that he would require double the plant he possesses to meet, at the temperature named, the maximum winter make. This supports the contention Mr. West submitted last week that the coal-gas plant is not in existence to enable, in present circumstances, the application of low temperatures to gas making.

The Outlook for Oil.

In the past the oil market has been wont to move in a mysterious way; and those who have anything to do with oil are resolved that it shall keep up its character in this respect. In our issue for Aug. 14 [p. 263], there was a quotation from the "Year Book" of the United States Bureau of Mines in which it was asserted that the estimated supplies of oil in the United States are sufficient to meet present needs for only 25 to 30 years. This estimate, it was said, "not only includes the oilfields already known and developed, but makes liberal allowances for undiscovered fields in prospective oil territories." It was also stated that, notwithstanding the incessant drilling that has been proceeding "the production to-day is little, if any, more than the production of 1915, nor have any large new fields producing petroleum been developed." These statements as to the position of the oil industry are fully supported in a manifesto issued by Mr. A. C Bedford, the President of the Standard Oil Company, and Chairman of the Committee on Petroleum of the Advisory Commission of the U.S. Council of National Defence. He shows that absorption of oil is greatly in excess of production—the development of the automobile being largely responsible, together with the increased demand for oil products. Returns from new drillings are not, he declares, as satisfactory as a year ago. He appeals for economy on the part of users and for continuous effort on that of producers, despite the discouragement of results and present heavy costs for drilling and developing. The "Petroleum Review" recently appealed for the greatest conservation in consumption; but it now urges that the better way to avert a crisis is to secure a larger supply, which goes without saying. There are, it tells us, territories not less prolific than the old awaiting well-directed drills; and it is asserted that Governments are holding richly oil-saturated lands which only require development, if opened up. The United States Government is one of these; but it is intimated that an agreement has been reached with it which is expected to result in the opening of millions of acres of rich oil land in California and Wyoming. It is considered that this action will put an end to the danger of paralysis of business over the whole of the western section of the country. Did the Bureau of Mines know anything of this development, or of the existence of the territories, when stating that their computations made liberal allowances for prospective oil territories? We should imagine they did; for it would be part of their business to be cognizant of what the Government were hoarding-up in this way.

The Miners' Open Mouth.

The Coal Controller and the Government are faced by an unpleasant demand, and large coal consumers are awaiting the issue with a considerable amount of uneasiness. The Miners' Federation of Great Britain have presented a request for a 25 p.ct. advance on the current wages of all men and boys employed in and about the collieries. A rough calculation puts the increase per head at 10s. per week; and with a million men engaged in the industry, this means £500,000 a week. The "Iron and Coal Trades Review" estimates that such an advance would mean 2s. per ton on the cost of production throughout the country; and it thinks that, if this is allowed, the Coal Controller could hardly resist an application for an increase of the 4s. excess over pre-war prices allowed by the Price of Coal Limitation Act. Many gas coal contracts are settled subject to any increase in the excess price being taken into account; so that for these, as well as for future war time contracts and purchases, the concession of 25 p.c., which is unthinkable in view of the wages now being earned by the miners, would mean a heavy load for large consumers. The gas industry is pretty well crippled now by the price that coal costs delivered on to the works; and the fresh demand of the miners is not regarded with anything approaching equanimity.

Analysis of Small Quantities of Light Oil.—In a paper contributed to the American Gas Institute by the Laboratories of the H. Koppers Company, Messrs. F. W. Sperr, jun., and A. Allison Kohr remark that chemists engaged on benzol recovery processes have for some time been interested in devising methods for the estimation of the principal constituents of the various light oils derived from coal tar or coke-oven gas. The authors have tested some of the numerous methods suggested during the past two years, and have found them to give satisfactory results, though they suffer from the disadvantage of being applicable only when large samples of the light oil are available. Their own regular method for the determination of light oil in coke-oven gas, which they expect to publish in a future paper, produces 20 to 50 c.c. of light oil, in a single determination. The method discussed in the paper was devised for the purpose of estimating the amounts of benzene, toluene, and solvent naphtha that such light oil could be expected to produce; the idea being to combine the light oil produced from two or three tests of coke-oven gas for each determination. The method has been employed for some time, and has given good results for the usual run of light oil samples, which generally contain at least 50 p.ct. benzene, and not over 30 p.ct. toluene. The accuracy is much less for light oil, containing less benzene or more toluene; but such material is not so often encountered. Such check determinations as the authors have made on samples of known composition, show that, with careful attention to details, the amounts of benzene, toluene, and solvent naphtha can be determined, with an error in each case amounting to about 1 p.ct. of the total light oil, which is satisfactory enough for ordinary purposes.

EXPLOSION AT THE GRIMESTHORPE WORKS OF THE SHEFFIELD GAS COMPANY.

Shortly after 6 p.m. on Monday of last week, a serious explosion occurred at the Grimesthorpe works of the Sheffield Gas Company, causing considerable damage to a station meter-house, the roofs of the exhauster-house, the iron store and blacksmiths' shop, and one or more lifts of a telescopic holder. The effects of the explosion were felt for fully a quarter-of-a mile; and in this radius houses of substantial construction were shaken, windows smashed, and slates from roofs loosened and shattered as they fell into the street. The flames shot up a couple of hundred feet in height; and after a few seconds the neighbourhood of the gas-works was overhung by a dense pall of smoke.

The meter-house contains two 250,000 c.ft. per hour station-meters; and the drum of one of these was under repair. The inlet and outlet of the meter are provided with hydraulic water-valves with seals 18 in. deep; and, as far as can be ascertained, owing to a temporary blockage, or sudden rush of gas, the seal was blown out of the inlet-valve, causing a large volume of gas to immediately fill the meter-house. From some unexplained cause, this ignited, blowing the front out of the building, and the roof off.

The recoil, after the explosion, ripped the sides out of an adjoining holder, 150 ft. in diameter, which is situate 40 ft. from the meter-house. The holder at the time was quite full of gas, and contained 1¾ million c.ft. This holder is of the four-lift type—the upper lift rising above the standards. The first and second lifts are still workable; and the fourth is believed to be undamaged. The third lift is the one that suffered most from the explosion; all the No. 11 gauge intermediate plates (between cup and grip and two rings of strong plates) being torn away, leaving a hole 102 ft. long by 19 ft. deep. This allowed some 800,000 c.ft. of gas to rush out; and the gas igniting made a huge flame, which extended 100 ft. in all directions, burning some sixteen men who were working in the vicinity. These men were sent to the Royal Infirmary, and nine of them are still detained in the institution; two of them, named Mottershaw and Towns, being in a somewhat serious condition.

The gas-works are situate in the centre of a number of large works; and the highly efficient ambulance resources of these were quickly in operation, with a success that called forth the warmest praise of the doctors who hurried to the scene. It may be mentioned that very valuable aid was rendered by the ambulances from Messrs. Vickers, Ltd., Cammell, Laird, & Co., Ltd., and W. Cook & Co., Ltd. The city fire brigade was also quickly in attendance, with three motor fire engines, and promptly dealt with the buildings that were on fire.

Gas-making had to be suspended until all traces of the fire were put out, and the plant examined to see the extent of the damage. Manufacturing operations were, however, resumed at 11 p.m.

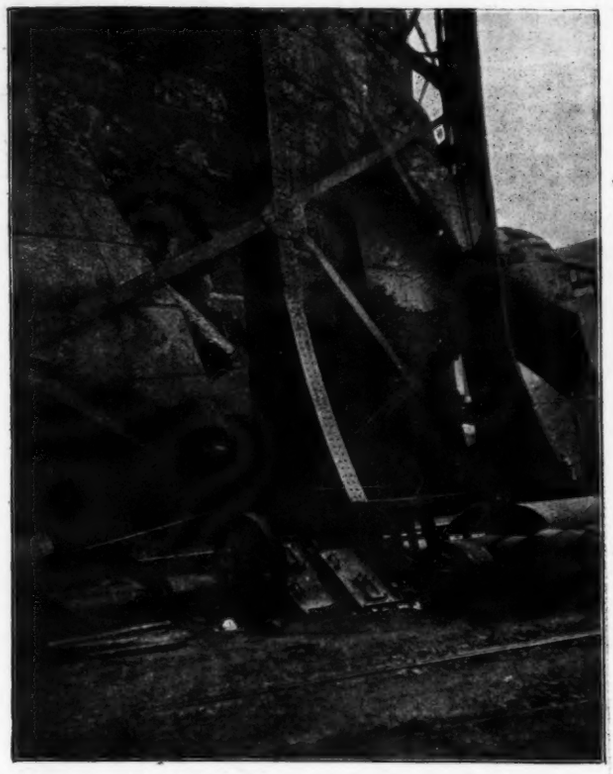
Mr. E. J. Wellens, the Superintendent of the works, sustained a slight injury to his leg, by stumbling over some *débris* after the explosion.

Referring to the accident, a local paper said:

Happily the noise of the explosion and the sight of the great tongues of flame enveloping the huge gasholders were more terrifying than the actual extent of the damage warranted. Not more than a couple of dozen cases of serious injury necessitated treatment, though many minor cases received first-aid attention. Though about 500 or 600 men are employed at the works, nearly all the day workers had left work half-an-hour earlier, and not more than about 60 remained in the works when the explosion occurred.

From the meter-house, the fire spread to the roof of the adjoining engine-house, workshops, and joiners' shop; but the fire brigade, with the aid of volunteers, quickly mastered the outbreak, and confined the damage to the meter-house, and one of the holders. The escaping gas became ignited; but no further explosions beyond that in the meter-house resulted.

The wrecked plant presented a scene of desolation to the early arrivals. Among the first of these was Dr. Damms, whose surgery is only a few hundred yards distant. To a press representative, he



afterwards admitted his surprise that the extent of personal injury was so comparatively slight. Some of the sufferers presented a somewhat ghastly appearance, with blood flowing from scorched and begrimed features. A number of women are employed at the works, and one was struck in the face by a flying brick. A man rushed to the surgery with the skin burnt off his hands and arms. He had thrown his arms over his face and head, and to this precaution probably owed his escape from serious injury to the skull. Several other men were overcome by the fumes.

Registration of Directors' Names.

Reference was made a fortnight ago to the provision for the registration and publication of Directors' names under the Companies (Particulars as to Directors) Act, which received the Royal Assent at the beginning of the present month. This measure extends to directors of companies, or persons who occupy the position of directors, and any persons in accordance with whose directions or instructions the directors of a company are accustomed to act, the provisions of the Business Names Act relating to partners in firms. While, however, the Business Names Act, in its application to firms, extended only to those in which the firm-name did not contain the true surnames (without any addition other than the true christian names) of its partners, the present Act applies to all companies registered under the Companies Acts, as well as to companies incorporated abroad that have a place of business in this country. Many firms and individuals who desired to remain immune from the provisions of the Registration of Business Names Act found themselves able to do so by means of registration under the Companies Acts. In order to deprive as promptly as possible these modest persons (natural-born British subjects or otherwise) of any advantages they may have secured by this procedure, the special obligation to file the required particulars not later than Sept. 2 is cast upon companies registered between Nov. 22, 1916, and the date of the passing of the new Act. The measure is an important one; and the precise bearing of its four sections will need to be widely understood. To this end, Mr. Herbert W. Jordan has written an explanatory booklet. The price of it is 6d. net; the publishers being Messrs. Jordan & Sons, Ltd., of No. 116, Chancery Lane, W.C. 2.

Radiator Heating.—The economy and advantages of radiator heating are the subject of the September issue of the British Commercial Gas Association's "A Thousand-and-One Uses for Gas." There are discussed separately the three types of radiators in connection with which gas or coke is used—that is to say, those heated by hot water or steam circulating from a central source; those heated by steam locally generated by gas-burners underneath, and usually called "gas-steam radiators;" and those that are heated by gas-burners producing hot air within them, and generally known as "steamless" or hot-air gas-radiators. Hints are given on the subject of fitting-up; while on the point of the hygiene of radiator heating, there are some quotations from an article by Mr. H. James Yates, which appeared in the "JOURNAL" for Nov. 8, 1910. The great variety of positions for which radiators are suitable is remarked upon; and this is further emphasized by a series of photographs of actual installations.

PERSONAL.

Mr. T. H. BEAUMONT, the Manager to the Annfield Plain and District Gas Company, has been appointed Manager of the Stratford-on-Avon Corporation Gas-Works, in succession to the late Mr. G. S. Kendall.

Mr. R. BYRON, the Manager of the Nenagh (co. Tipperary) Gas-Works, who has been appointed Gas Manager at Peel (Isle of Man), is a grandson of the first Manager of the Nenagh works. Until now, the name of Byron has always been associated with gas in Nenagh.

Mr. W. NEWTON DREW, Managing Director of Messrs. Newton, Chambers, & Co., Ltd., whose paper on the "Rectification of Benzol," read before the Midland Institute of Mining, Civil, and Mechanical Engineers, was reported in the "JOURNAL" for March 13, has been granted a Commission in the Motor Transport Department, A.S.C.

The works employees of the British Gas Company at Hull have presented Mr. A. ALLAN, the Under Manager, with a gold watch chain, seal, and a matchbox, as a mark of their respect and esteem. Mr. Allan has retired after forty years' service with the Company, Mr. John Young (the Engineer and Manager) made the presentation; and Mr. Allan, in replying, recalled the many happy times he had spent with the staff.

Mr. D. T. MARWICK, who has been eleven years with the Glasgow Corporation Gas Department as Assistant Chemist, Chief Chemist, Superintendent, &c., was presented by his fellow employees with a handsome set of fish knives and forks, with a silver hairbrush for his wife, on leaving the service of the Corporation to take up the position of Assistant Engineer and Manager at the Greenock Corporation Gas-Works, under Mr. George Keillor.

The Military Cross has been awarded to Second-Lieutenant HILTON FURNISS, of the West Riding Regiment, for conspicuous gallantry and devotion to duty in leading his platoon with great dash and determination against very heavy hostile machine-gun and rifle fire. He was twice wounded, the second time severely in some fourteen places. But in spite of this, he continued to urge his men to hold their line until brought in at dusk by a stretcher-bearer. Before the war, Lieutenant Furniss was the Assistant, Manager at the Slaithwaite Gas-Works.

Mr. A. W. GREY, who for the last six years held the position of Chief Assistant to Mr. Frank Livesey, the Engineer and General Manager of the Maidstone Gas Company, has recently been appointed Engineer and Manager to the Seaford Gas Company. Mr. Grey, who is 35 years of age, was educated at Rutherford College Newcastle-on-Tyne. He served as an articled pupil to Messrs. John Abbot & Co., Engineers, of Gateshead-on-Tyne. On the completion of his articles, he was appointed Junior Assistant to Mr. A. B. Walker, of the Walker and Wallsend Union Gas Company. For the last thirteen years, Mr. Grey has been on the staff of the Maidstone Gas Company; and at the last meeting of the Directors a minute was passed as follows: "The Board wish to record their appreciation of his valuable services to this Company, especially as to the ability displayed by him in his outside work and in obtaining new business for the Company." He is a member of the Southern District Gas Association of Gas Engineers and Managers.

MR. MAURICE GRAHAM.

The Shipping Controller has requisitioned the Minister of Munitions for the services of Mr. Maurice Graham as Chief Construction Engineer of the Ports Branch of the Ministry of Shipping, in connection with the building extensions and mechanical equipment required at the ports.

Mr. Graham entered the Ministry of Munitions early in 1915 as a voluntary worker, and designed and erected the first gun ammunition storage and fusing factory at a Western port. Upon its completion, he was asked by Sir Eric Geddes to accept the post of Director of Construction and Equipment of the National Gun Ammunition Shell Filling Factories, which have played such an important part during the war. Each factory covers some hundreds of acres, and employs thousands of munition workers. The rapidity of erection, equipment, and organization of this huge undertaking (the structural expenditure on which runs into millions of pounds) was a feat of which Sir Eric Geddes was justly proud, and was accomplished within twelve months. Mr. Graham was then invited by Sir S. H. Lever, the Assistant Financial Secretary to the Ministry (afterwards Financial Secretary to the Treasury), to join the Finance Department, controlling constructional expenditure, loans, &c.

Having always been known for his high-speed engineering and constructional work (based on up-to-date ideas), we are not at all surprised to hear that Mr. Maurice Graham's services are in demand by the Government departments at the present time; and in his present sphere he will be quite at home.

Calorific Standard Orders.—The Board of Trade inform us, through Mr. Garnham Roper, that they have made Orders under the Gas (Standard of Calorific Power) Act in respect of the Radcliffe and Pilkington Gas Company, the Horley District Gas Company, and the Tunbridge Wells Gas Company.

CRUDE BENZOL, CRUDE NAPHTHA, AND LIGHT OILS ORDER.

THE Minister of Munitions, in exercise of the powers conferred upon him by the Defence of the Realm Regulations, and of all other powers enabling him, orders that—

1.—No person shall, as from Oct. 1, 1917, until further notice, supply to any person, or take or accept or attempt to obtain delivery of, any crude benzol, crude naphtha, or light oils containing recoverable quantities of benzol or toluol, except under and in accordance with the terms and conditions of a licence issued by or under the authority of the Minister of Munitions, or under and in accordance with the terms and conditions of a contract in writing for the delivery of such articles existing at the date of this Order.

2.—All persons engaged in producing, treating, distributing, storing, selling, or dealing in crude benzol, crude naphtha, or light oils, or in any manufacture, trade, or business in which the same or any of them are used, shall make all such returns with regard to their businesses as may from time to time be required by or under the authority of the Minister of Munitions.

3.—For all purposes of this Order the following expressions shall have the following meanings:

"Crude benzol" and "crude naphtha" shall mean crude benzol and crude naphtha obtained by the distillation of coal tar or extracted from coal gas, including benzolized wash-oil before separation of the crude benzol.

"Light oils" shall mean light oils obtained by the distillation of coal tar.

All applications in reference to this Order, including applications for licences, should be addressed to the Director of Raw Materials Supply, Ministry of Munitions, Department of Explosives Supply, Storey's Gate, Westminster, S.W. 1.

LIMITATION OF GAS SUPPLY IN GERMANY.

THE question of the limitation of the gas supply is still exercising the minds of the citizens of Berlin; and the correspondent who has hitherto favoured us in this matter forwards two further translations of articles which were published in the "Vossische Zeitung" of the 23rd ult. These will no doubt interest readers.

EXTRACT from the "VOSSISCHE ZEITUNG," of AUG. 23.

GAS LIMITATION.

The discussion which the representatives of the six towns forming Greater Berlin and of most of the Suburban Communes, as well as of others interested, had yesterday with the Commissioner for Electricity and Gas lasted several hours.

The Government Commissioner for Coal Distribution, who took part in the discussion, pointed out the necessity of some limitation, as the consumption of gas must be made to coincide with the quantity of coal at disposal. The representatives of the communes admitted the necessity of some limitation, but attacked the form and contents of the decree issued by the confidential officials.

The Chief Burgomaster of Berlin gave the reasons, at the request of the Communes of Greater Berlin, for the amendments which these had in common proposed.

Government Commissioner, Prof. W. Kübler, stated that he was prepared to take the suggestions into consideration. These were that, in the first place, the consumption must not in future be based upon the capacity of the meter.

Some limitation of the consumption can, however, scarcely be avoided. It is proposed that this limitation shall be 10 p.ct. As a basis, the consumption during a quarter, and not during a month, shall be fixed. In order to treat the small consumer with consideration as much as possible, an "existence-minimum" shall be allowed free. The prepayment meter shall not come under the decree. It was further emphasized that the efforts of the communes should be directed to preventing the confidential officials having power to lay down the most peremptory stipulations. The conditions must be fixed by the communes—in this case through the Union of Greater Berlin.

A Special Committee was formed this morning in order to formulate more exactly the demands respecting a percentage limitation and other special requirements.

Stress was also laid upon the fact that Greater Berlin needs a quicker and better coal supply. On Tuesday already a discussion had taken place in the Rathaus upon this question, at which a representative of the Government Commissioner for Coal Distribution as well as of the Chief Command took part.

The Chief Burgomaster informed a contemporary that all parties—including the Government Commissioner for Electricity and Gas—desired that the discussion should as speedily as possible be brought to a satisfactory conclusion. It was to be hoped the new stipulations, which will probably come into force at the end of August, will cause as little inconvenience to the consumers as possible.

CHARLOTTENBURG ON THE GAS AND HEATING QUESTIONS.

The Charlottenburg Town Council had yesterday before them a motion of urgency, in which the Court of Aldermen is invited to protest energetically against the basis which the officers appointed by the Commissioner for Gas and Electricity have fixed.

Before any discussion of the matter took place, the Chief Burgomaster acquainted the meeting with the results of yesterday's interview of the representatives of Greater Berlin with the Government Commissioner.

The notorious decree of the officials has evoked the justified astonishment of the various communal authorities. The consequence was that, finally, the authorities of Greater Berlin met and arranged for an interview with the Government officer, which took place yesterday.

The first question put to the Government official was whether the decree which so deeply affected the economic life of Berlin—that gas must be saved to the extent of 20 p.ct. of that used the previous year—must stand. The Government Commissioner, and also the representative of the Chancellor who was present, convinced the town representatives that economy must be effected. The reasons for the necessity could not be publicly discussed. The General Government decree that this year only 80 p.ct. of the previous year's consumption may be used will consequently, in all circumstances, stand.

The method proposed for Greater Berlin is not the right way to effect a saving of 20 p.ct. The critics of the measure, with justice, asserted that for the first time it is not the Communes themselves who have been entrusted with the carrying out of the decree, but officials who have no authority to represent the citizens. This point will in future be taken into consideration by the Government Department.

The Chief Burgomaster acquainted the meeting with the proposed amendments mentioned above. His statements were received with assent. A member expressed the thanks of the meeting for his energetic intervention. Another member doubted the possibility of carrying out a general reduction, without great danger to economic life. Another asserted that the gas-ordnance was typical of the war enactments. A couple of men come together and decree something out of hand, without being at all clear as to the practicability of carrying it out. Then follow protests. Against this method of utter regardlessness towards the consumers, the most energetic protest must be made. For this reason, the action decided upon by the Councils of Greater Berlin will be welcomed. One can see by the decree that conditions are extraordinarily bad, because last year everybody was economical in the use of gas. The whole thing is a perfect muddle. It is inexplicable what will happen in the winter. There is not enough coal for heating, and the supply of hot water is consequently limited. Some supplementary arrangements must be made. Those who last year burnt little or no gas, and made as much use as possible of electricity, cannot take nothing from nothing—*ex nihil nihil fit*.

Failure is everywhere, because the organization is bad. We certainly have a Commissioner for Gas and Electricity; but he is not competent in matters relating to the coal supply. Then we have a Coal Commissioner; but he is not competent in the matter of the delivery of coal. And so it goes on. It is here where the axe must be applied.

It cannot be foreseen what will happen in winter if the towns do not receive more coal. The whole of our war industries will suffer immensely. It is the cry of the day that the State should break with the Coal Syndicate (which thoroughly well knows how to look after its own interests) and nationalize the whole coal trade.

The meeting accepted the motion, with the recommendation that the magistrates should also protect the interest of the citizens in the matter of the limitation of the hot-water supply.

ELECTRICITY SUPPLY MEMORANDA.

IF anticipation is right regarding the likelihood of the Board of Trade Electric Power Supply Committee being favourable to the formation of large centralized electricity generating-stations, privately capitalized, and to the supply from them in bulk to authorized distributors, it is obvious that the scheme of the Lancashire and Cheshire Electric Supply Committee (noticed last week) will come into conflict with the proposals. If so, the Board of Trade will hardly be able to look kindly upon the Lancashire and Cheshire project; and it will then probably come to naught. There are already signs of jealousy and mistrust between municipal and company representatives; and whatever is done with the intention of raising the economic status of the electricity industry, it is certain that there will not be unalloyed pleasure all round. It will be remembered [see last week's "Memoranda"] that the Lancashire and Cheshire Committee recommended the formation for these counties of a Joint Board possessing plenary powers, and working with District Boards appointed from itself. On the Joint Board there would be ninety members; but only eleven of these would be the representatives of four companies. Naturally, in such circumstances, the companies can see themselves completely swamped and impotent, and, looking to the character of the powers proposed to be conferred on the Board, they can see the companies delivered body and soul into the hands of the municipal dominating force. On the other hand, the scheme itself is a tacit declaration that the Lancashire and Cheshire municipal authorities have no wish (whatever the Departmental Committee may think) to be dominated, in the matter of generation, by large companies in which the municipalities could not, from the very nature of their financial powers and obligations, have any material part. Another aspect of the matter that does not appeal to the company component of the proposed Board is that it is contemplated that the Board shall have large advisory and vetoing authority over extensions of generating plant and so forth, as well as the power to erect new stations, and acquire existing or new ones. What does this mean if not that the integrity of the company concerns as complete organizations, and therefore as sources of investment, would be assailed, that administrative responsibility would be divided, and that over one part of the administration the investing shareholders would have no power

Mutual Fears.

of control? Of that, they would be wholly deprived. Under the circumstances, it is not astonishing that the representatives of the companies on the Committee were not prepared to sign proposals that relinquished any part of the rights, powers, and privileges of the concerns. Interlinking was a matter quite innocent of any parting with existing powers.

Discounting the Benefits of Unification.

Fears exist in another direction. It is suggested that many advantages would accrue if all the undertakings in the two counties were concentrated in one owning and operating authority. Much of the time at present involved, and much of the expense incurred, would be saved. To an extent this is true; but, at the same time, what has happened in the case of the Metropolitan Water Board might occur in connection with the octopus-like Electricity Board with power to own and operate over such a large territory as Lancashire and Cheshire. In such a case certain of the more favoured undertakings see the prospect of the position of their present areas being jeopardized. Their capital expenditure per kilowatt of plant installed is something perhaps on which they pride themselves; the cost per unit generated, and consequently the selling prices may be low. On the other hand, just the contrary conditions may exist in connection with other concerns; and the local conditions may be unfavourable. Thus, it is acknowledged by the Committee that centralization might, unless adequate safeguards are provided, adversely affect the best circumstanced undertakings, and, at their expense, improve the conditions of those in less affluent circumstances. Naturally, this would be so; but there has been a lot of preaching as to the advantages of concentration, as to load and diversity factors, and as to conferring benefits on the larger number. The advantage to the already well-endowed concerns, we understood, was to come from further generation economy; and to gain this they could surely afford to give up something. But there is the inevitable fly in the ointment. Centralization and consolidation are all very well, it is argued, so long as the position of an individual concern and that of its consumers are not being prejudiced. Elimination of the less efficient stations cannot alter local conditions or iron-out inequalities. If the good-conditioned concerns are to be dragged down by having piled upon them a number of worse conditioned undertakings, and so have the level of their own better conditions lowered, then there may be cause for wishing they had never committed themselves to the scheme—that is to say, if it materializes. There is a significant note in the report bearing upon this. The signatories make it quite clear that the contained recommendations and suggestions represent their own personal opinions, and not necessarily the views of their respective undertakings. They are wise to have done this; for there is no doubt the scheme will be dissected with very great care by those who are directly responsible for the administrative control of the undertakings. But here and there are detected signs that the Committee have attempted to stave-off opposition. For instance, they recommend that the acquiring of existing stations should only be exercised after the Joint Board have approved thereof by a majority, which would be subject to the sanction of the proper central Government tribunal. The company undertakings will find poor protection in this with their pigmy representation. A two-thirds part of ninety is sixty, and the companies' representation numbers, as we have said, only eleven—at least, that is as we understand the position.

Interference with Profit Making and Taking.

It is proposed that the Joint Board shall see that the distributing undertakings do not take undue advantage of the cheaper supply which it is hoped the Committee's plans will furnish. The Committee are sanguine as to the future. They find that the undertakings concerned generated no less than 421 million units during the year ending March 31, 1916. Under normal conditions, the rate of increase is said to be about 20 p.ct. per annum; so that it is thought fair to expect during the next five years an increase to 1000 million units. As "normal conditions" are mentioned, we suppose it may be taken that the calculation has been made on pre-war conditions. Under these conditions, and with large units of plant—say 10,000 to 15,000 KW.—concentrated in suitable localities, with high-tension transmission, and the utilization of sources of waste heat, it is considered that there would be a large reduction in annual costs, and supplies would be given to the distributors at cost price. Here the Committee stick their fingers into the municipal pie, and propose interference with local policy in a way which not a few councillors will severely resent. We do not say the Committee are not right—in fact, there is approval in the main. In the first place, the undertakings receiving current at cost price, the Committee are of opinion that it may be necessary to introduce safeguards to ensure that the advantages of the cheaper production arising out of a federation of interests are not neutralized by the distributing authorities charging unduly high prices to the consumers within their area. Further the Committee treat the administrators to a little sermonizing on the subject of the making of profits for aiding the rates. The antagonism of the "JOURNAL" to rate-aid is not a thing of yesterday; and in our editorial columns last week, the iniquity of drawing from the rates part of the current war costs of supplying electrical energy was commented upon. In setting forth a basis of charges for supplies, the Committee have not made provision for any "direct" profit on sales for the purpose of rate-aid, which must, therefore—in the absence of any legislation—be left to be decided by each undertaking, as at present, in accordance with the accepted local policy. The Committee cannot refrain, however, from giving expression to the opinion that the practice of making profits for the purpose of handing over substantial grants in aid of local rates is detrimental to the interests of an adequate and economical supply of electricity, particularly for industrial purposes. On the other hand, they lay stress on the necessity of making adequate provision for depreciation and obsolescence of plant. There are municipal administrators who will present a very straight back to the suggestions of interference with what they regard as their own prerogative in the matter of making rules as to procedure within the terms of their parliamentary powers.

Gas-Stoves and Electric Light Users.

The colliding influences that are at work in connection with the schemes that are in the making for improving the economic conditions of the electrical industry, do not present subject-matter for the most sprightly reading. Let us turn to another topic which may perhaps have a little alleviating effect. The writer of "Gossip" in "Electrical Industries" refers to the recent letter of Mr. J. E. Kenshole to the "JOURNAL" and the comments thereon respecting the attitude of certain Government Departments towards gas lighting [*ante*, pp. 267, 285] when departments associated with the work of the war are urging the public to use yet more gas for the purpose of providing greater supplies of explosives and liquid fuels. Our contemporary does not specifically say whether or not the Government Department responsible for the turning-out of gas lighting are justified in their action when other departments are appealing for a larger consumption of gas in order to assist with those things that are urgently required for defeating the enemy. He probably hardly cares to line-up with those contemptible persons who, animated by self-interest rather than national safety, would not lift a finger to help to destroy the power of the enemy. But he thinks he has a good set-off to Mr. Kenshole's complaint in the following statement, which if it proves anything at all is that the writer has disclosed a powerful incapacity for looking at things fairly and squarely in the light of actual conditions. He writes:

> In a case recently brought to our notice, a house wired for electric light was rented in the area of the South Metropolitan Gas Company; and when the tenant applied for the installation of a gas-stove on hire, he was refused it unless gas were used throughout the house for lighting. This is not the first case of the kind we have encountered. The Gas Company's action may be legal, but it is altogether contemptible. Very few tenants have the gumption to fight against coercion of this kind, or to get the electric supply undertaking to fight for them. The pious horror of the gas companies over the alleged preferential trading at Hackney becomes sheer hypocrisy alongside the bullying of householders to use a mode of lighting they do not want. If the electric-supply undertakings were alive to their opportunities, they would realize that the gas companies are making the way easy for the introduction of electric cooking.

The tall language and the tone of injury incorporated in this piece of foolishness are grotesque in the light of the facts of the current position. "Contemptible," "coercion," "hypocrisy," and "bullying!" And yet the electric light users have the choice of gas, coal, and electricity for cooking and heating purposes, but (notwithstanding that some mentally deficient persons think that electricity, no matter the temperature used, will save "meat") have a preference for the labour-saving, dependable gas, by which temperatures can be controlled to any desired degree!

The Real Position.

Let us examine the position from the Gas Company's point of view. They are in just the same situation as the electricity suppliers regarding the shortage of supplies of cookers and fires, and the scarcity of hands for fitting, besides which conveyance is difficult owing to the lack of men for attending to heavy goods. The result is they have to deal with applications for stoves and fires in what they consider to be the best possible manner for their undertakings. There is no "coercion," and no "bullying." The people who deserve their first consideration are surely those who have long been, and continue to be, their customers. It would be sheer folly to neglect them for others, who, on the return of easier conditions in the coal market, might send back the stoves on hire, or might later be foolish enough to fall victims to the solicitations of the electric-cooker canvasser. No gas company, however, with spare cookers and fires and any available labour, would refuse electric light users; and some are, in these times of stress, doing business with them on hire-purchase lines, which is preferable in their case to simple hire, seeing that possession of the stove ensures custom. There is another thing that must influence gas companies in this matter. Through capital restrictions, shortage of men at the works of contractors, and the number of gas-plant works now in Government hands for munition purposes, it has been impossible to seriously take in hand the question of plant extensions. Compared with normal times, the work done in this way during the war has been a mere dribble. Maintenance has been as much as some undertakings have been able to keep pace with; and this work materials and labour have made very costly. Last winter during the heating season, outputs in several cases on some days and weeks were 40 to 50 p.ct. in excess of the

corresponding days and weeks of the previous winter. During the cold months, many undertakings had to meet demands for gas averaging 20 to 25 p.ct. more. What would the electricity stations have done with such big erratic heating demand as this? But what is the result in the case of some gas undertakings for the coming winter? There are several that, with last year's experience before them, and the impossibility of extending their producing and storage power, have, much to their regret, had to cut-off dead for the time being the making of further connections of stoves and fires, so as to ensure full and constant supply to the present connections during the winter months. Again, there are other concerns with plant to spare, but oil supplies have been totally suspended by the Government, and until they see on the works surplus stacks of coal for winter use, they are chary of increasing their commitments in respect of supply. On the other hand, there are some gas undertakings, with surplus plant and stocks of coal assured, that are willing and pleased, providing they have the stoves and fires and men to fit them, to accommodate electric light users. It is all a matter of the individual position of the gas undertakings how, in these war times, they treat the business of additional cooker and fire demand. The writer of "Gossip" in "Electrical Industries" has yet to learn that fairness and prudence in business dealings are not "contemptible," and do not constitute "coercion," "hypocrisy," or "bullying;" and, unless he has the capacity for examining a question from all points of view, he should at least have sufficient courtesy to exercise a little discretion in his choice of expressions when dealing with commercial rivals.

LOCAL ADMINISTRATION.

WITH a view to economy, the annual report of the Local Government Board, already much curtailed, has been still further reduced in size, by the omission of tables, statistics, and other matter which has hitherto found place in its pages. Thus shorn, the forty-sixth report—relating to the year 1916-17—has recently been published.

Of the three parts, notice need only be taken of the last, which deals with public health, local administration, local taxation, and valuation. In the first place, reference is made to the report of Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act. Some extracts from this report have been appearing in the last three issues of the "JOURNAL." It is pointed out that, with the depleted staff, it has not been found possible to carry out fully the different lines of work under the Act which was performed before the war; and only the most urgent duties have been undertaken. An unusually large number of new works have required inspection and consideration. Among others, there has been a substantial increase in the number of tar-works registered, which has been almost entirely due to the rapid extension of the use of tar dehydrating plants in gas-works.

In the matter of loans sanctioned to local authorities, the policy laid down in the previous report has been strictly maintained during the past year. That is to say, in consequence of the vital necessity of ensuring that both capital and labour should be made available in the directions in which they could best favour the national interests, the stoppage has, as far as practicable, been secured of works in progress, and the postponement of new works, except such as were of pressing need, and the borrowing of money by local authorities has been restricted within the narrowest possible limits. As regards expenditure on works which had not been commenced, the loans sanctioned to local authorities during the year under review were almost entirely made for purposes connected with the war—*i.e.*, for plant for the supply of electricity, for extensions of gas-works, and plant to assist in the production of materials used in the manufacture of high explosives. Thus of the total loans (£2,721,475) sanctioned to local authorities, no less than £1,877,114 was for purposes in connection with the war. The total represents a reduction of £1,536,498, or 36 p.ct., on the amount of loans sanctioned by the Board in the previous year—namely, £4,257,973. During the three preceding years, the average total was round about £13,500,000. In addition to refusing assent to schemes which did not seem to them to justify the expenditure at the present time, the Board have, in cases where their sanction or approval was not required, endeavoured to induce the local authorities concerned to postpone action during the existing national emergency; and they are able to state that, generally, there has been a praiseworthy disposition to meet their wishes in this respect.

To assist them in dealing with problems which are likely to arise in the distribution of labour and employment, the Board are compiling a register of works to be executed after the war. To this end, a circular was issued last year asking for information as to works which might be undertaken by local authorities on the conclusion of the war, and as to those contemplated by other bodies or persons in the area within their jurisdiction. In response, a large number of returns have already been received; and those who have not sent on the required information are urged to do so without delay. Where the borrowing of money is involved, the early submission of proposals to the Board for consideration will avoid unnecessary delay when present restrictions on borrowing and on the execution of works are withdrawn.

Reference is made in the report to the Gas (Standard of Calorific Power) Act, 1916, which enables Government Departments to make Orders, upon the application of gas suppliers, for the substitution of a calorific standard for the illuminating standard prescribed by the Special Act relating to the undertaking. Under this, the Board have [as has from time to time been recorded in the "JOURNAL"] made a number of Orders prescribing a calorific standard of 500 B.Th.U., and imposing upon the local authorities the obligation to supply gas at a pressure of not less than 15-10ths. Before, however, making the Orders, they ascertained from the Ministry of Munitions that the local authorities had taken the action contemplated under the Act for the production of benzol and toluol.

Under the Local Government (Emergency Provisions) Act, 1916, there has been a temporary cessation of the publication of the separate volumes making up the "Annual Local Taxation Returns." But a summary is being prepared for presentation to Parliament.

There is a *résumé* of the legislation of 1916-17, as affecting the powers and duties of local authorities. This includes the provisions for regularizing the position of employees on service with the forces, and for enabling those authorities who are subject to the Board's audit to dispense with the publication of an abstract of their accounts in a local newspaper.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Staveley Coal and Iron Works.

On Saturday, about twenty members of the Manchester and District Junior Gas Association had the pleasure of visiting the Staveley Coal and Iron Company's works. The party were met at the station by Messrs. F. E. Wright (the Manager of the Foundry Department), P. Wilson (the Manager of the new works), and J. Chambers (the Manager of the old works), who guided them round the foundry, lucidly explaining the various operations in progress. The visitors were interested in the casting of iron pipes for gas and water, and the method of testing pipes used for water supply. Other shops inspected were the shell-shop, where female labour is employed, and also the wood straw shop, where old pit-props were being cut up into wood straw, which is now so largely used by packers. It was interesting to learn that prior to the war large quantities of wood straw were imported from Germany; but now this work is being done in our own country, and at considerably less cost.

The party were invited to have luncheon in the Company's dining-room, and were there joined by Messrs. J. A. Wilson (the Manager of the coke-oven works, &c.) and C. E. Whitehead (the Manager of the chemical works).

Mr. S. CARTER (Garston), Senior Vice-President, in proposing a vote of thanks to the Staveley Coal and Iron Company, and to the gentlemen present who represented the Company, said that about nine years ago the Association had the pleasure of inspecting the Staveley works; but he would venture to say that those who were there on the former occasion would to-day see that vast developments had taken place, particularly on the chemical plant.

Mr. W. HILL (Stalybridge) seconded the vote, and said that for the last 25 years he had been using pipes made by the Company. During the whole of this period he had never had occasion to make a complaint; and he was perfectly satisfied with the workmanship they had given him.

Mr. W. BUCKLEY (Droylsden), the President of the Association, remarked on several of the items of the morning's visit, and added that he considered the most interesting part of the programme would be the afternoon visit to the coke-oven and chemical works.

Mr. WRIGHT acknowledged the vote, and said the Company made every effort to turn out the best class of work. They had supplied castings to all parts of the world, and received very few complaints. The Chairman of the Company was a very progressive man, and possessed original ideas; and to-day they would see some of the results. The Company have five collieries, with an annual output of 2½ million tons of coal. These coals have had a high reputation in the markets for upwards of a hundred years.

Under the guidance of Messrs. Wilson and Whitehead, the party then inspected the coke-oven and chemical works. It was noticed that the fullest use is made of the various processes, and that what would be waste in other works is here turned to account. The guides took great pains to make the visit a success, and were called upon to answer a number of questions.

Obituary.—The death has occurred, at the good old age of 87, of Alderman Henry Laver, the Chairman of the Colchester Gas Company. It is interesting to note that the previous Chairman died at the age of 91 years.

Eastern Counties Gas Managers' Association.—The autumn meeting of the Association will be held in the Queen's Room at the Holborn Restaurant, at 2 o'clock on Friday, Sept. 28. The new President (Mr. J. H. Brearley, of Longwood) will be inducted to the chair; and he will begin his year's office by opening a discussion on "War Time Experiences of Gas Undertakings." War time has been prolific in unusual experiences; and so the subject should give rise to an excellent discussion.

THE CHEMISTRY OF COAL.

THE importance to gas makers of a great renewal of scientific activity in the chemical investigation of the composition and constitution of coal was the subject of an eloquent and lengthy address delivered by M. ROULAND recently before the Société Technique du Gaz en France. The following is a much abridged translation of the address as published in the "Journal des Usines à Gaz;" but it will be sufficient to show the emphasis laid by M. Rouland upon the national importance of more refined methods of investigation in the extension of knowledge of a complex material such as coal, particularly in regard to the more efficient use of the bye-products produced in its distillation.

Reviewing past methods of investigation, proximate analysis had consisted chiefly in determining moisture, ash, and coke, and by working upon a works' or laboratory scale, determining the yield of coke, gas, ammonia, and tar, and the calorific power of the gas by combustion with oxygen in the Mahler calorific bomb. The customary methods of ultimate analysis had been applied to determining the quantities of carbon, hydrogen, sulphur, and nitrogen in a coal, estimating the oxygen by difference. In reference to other methods, he cited the treatise "Le Gaz," by M. René Masse, as containing, up to the date of its publication (1914), the most comprehensive account of the scientific examination of gas-making materials which could be consulted. He laid especial stress on the inadequacy of the results of ultimate analysis to give the information which the gas-maker required. The results were expressed in terms of the ultimate elementary constituents of the coal. It was as reasonable to expect a naturalist to classify an extinct animal with only the finely ground substance of a bone before him, or an archæologist to date a cathedral from the dust of one of its stones.

In regard to the computation of calorific power from results of analysis, later investigation had sufficed to show the inapplicability of the so-called law of Dulong of 1849—viz., that the heat produced by a fuel was equal to the total of the quantities of heat produced by the combustion of the elements of which it was composed, leaving out of account the portion of hydrogen which formed water with the oxygen contained in the fuel. The "law," as Sheurer-Kestner and others had shown, was founded upon insufficient grounds. It was out of relation with the actual facts of the combustion of fuels such as coal, in which the chemical condition of the oxygen, nitrogen, and sulphur was an unknown quantity. The hydrogen might be combined with the oxygen or with the carbon; hence the results obtained in accordance with the Dulong law would be sometimes too high and sometimes too low, to an extent which deprived them of all real significance.

The results of ultimate analysis may be examined in reference to the fact that in the pure woody material, cellulose, the proportion of oxygen is one-tenth that of carbon; while in fuels which have undergone a greater degree of change—*e.g.*, anthracites—the proportion of oxygen is only one-fortieth of that of carbon. The comparative decrease in hydrogen is also appreciable, though much less marked. In cellulose, there are 139 parts of hydrogen to every 1000 parts of carbon; in coals, there are only from 75 to 40; in anthracites, only 40 to 25. Further, as oxygen disappears from a fuel (with age) more rapidly than hydrogen, the factor O/H, or $\frac{O+N}{H}$, becomes a characteristic of the fuel. In contrast with this is an analysis of two coals quoted by M. Grüner. Though of nearly identical composition, one (*a*) is a coking coal, the other (*b*) non-coking.

	a	*b*
Carbon	75·2	76·0
Hydrogen	4·0	4·3
Oxygen	16·0	16·0
Ash	3·0	3·3
Moisture	6·3	5·4

On the other hand, coals of very different composition exhibit the property of agglutinating during combustion. Their analysis gives no clue to their behaviour, which, it may be assumed, depends on the molecular arrangements of the constituents. Where fuels are classified, as they are by Ser, on the basis of their proportion of hydrogen over and above the quantity required to combine with the oxygen in the fuel, gas coals are those with the maximum of excess of hydrogen—*e.g.*, 3·5 to 3·4 p.ct.

Referring to the classical researches of Regnault in 1837, on the classification of mineral fuels, M. Rouland pointed out the conclusion that the proportion of oxygen in a coal was greater the more recent its origin; the proportion of carbon varying in an opposite direction. Certain anthracites which form an exception to this rule were probably the result of a species of metamorphism under the influence of volcanic change; but an exception of the opposite kind has never been met with—*i.e.*, the existence of true coal in deposits which have reached the anthracitic stage.

M. Rouland proceeded to impress upon his audience the invaluable service which was rendered to gas makers by the classification and tests of gas coals carried out from 1873 to 1875 by M. St. Claire-Deville, and subsequently supplemented by him to the extent of including the examination of 1818 different coals coming from 58 different sources. He quoted *in extenso* from M. St. Claire-Deville's previous papers, and reproduced the latter's table, which is a summary of these comprehensive observations. The latter is no doubt familiar to those who have followed the experimental work that French gas chemists have contributed to successive congresses of the Société Technique, but are quoted below in an English version as the result of converting, where possible, the metric measures into the customary British units.

The coals referred to in the table as Types I., II., III., &c., are identified by M. St. Claire-Deville as the result of a series of analyses, summarized in the following table, which gives percentage composition apart from the ash-content:

—	Type I.	Type II.	Type III.	Type IV.	Type V.
Hydrogen	5·06	5·37	5·40	5·53	5·64
Carbon	88·38	86·97	85·89	83·37	81·66
Nitrogen	2·00	1·00	1·00	1·00	1·00
Oxygen	5·56	6·60	7·71	10·10	11·70
	100·00	100·00	100·00	100·00	100·00

Turning to the more modern attempts which had been made to ascertain the true chemical nature of coal, M. Rouland instanced first the production by Berthelot of benzene, toluene, styrolene, naphthalene, and anthracene from acetylene, and the confir-

—	Type I.	Type II.	Type III.	Type IV.	Type V.
	Average from Regions:				
	A and C.	A, B, C.	A, B, C.	A, B, C.	C.
Volatile matter (*ex* ash)	28 658	32·753	35·102	38·261	49·115
Distribution of products of distillation of 100 parts by weight of coal: Gas	13·271	14·054	14·931	15·950	13·349
Condensed water	4·204	5·109	8·089	8·152	14·370
Tar	4 556	5·486	6·149	6 989	7·547
Coke	75·294	72·188	69·943	66·570	60·872
Various and loss *	2·675	3·163	2·888	2·399	2·862
Total	100·000	100·000	100·000	100·000	100·000
Volume of gas (at 50° Fahr. and 760 mm.)—cubic ft. per cwt.	546·6	541·1	549·5	532·5	479·8
Consumption for 1 carcel (9·82 British candles) (50° Fahr. and 760 mm.) Dumas & Regnault. c.ft.	4·297	3 876	3·733	3·549	3·562
Quantity of light—British candles per cwt. of coal	1151	1374	1448	1477	1727
Density of gas (at 32° Fahr. and 760 mm.)	0·3368	0 3606	0·3803	0·4161	0·4485
Volumetric composition of gas: Benzol vapour	0·905	1·001	1·066	1·090	1·094
Unsaturated hydrocarbons	2·430	2·810	3·198	3 858	4·403
Methane and nitrogen	31·790	32·730	32·829	32·919	32·004
Hydrogen	57 041	54 720	53 409	50·439	48·252
Carbon monoxide	6·379	7 074	7·615	9·106	10·702
Carbon dioxide	1·055	1·265	1 483	2 188	3·145
Oxygen	0·400	0·400	0·400	0·400	0·400
Total	100·000	100·000	100·000	100·000	100·000
Benzol—lbs. per 1000 c.ft.	2·108	2·331	2·482	2·536	2 553
Coke—gallons per 1000 c.ft.	12·22	11·56	11·10	9·06	8·58
Temperature in hydraulic main ° Fahr.	133·3	135·5	144·1	154·0	175·2
,, retorts ° Fahr.	1624	1620	1616	1626	1569

* Includes graphite, cleanings from ascension pipes, matter absorbed in purifiers, &c.

mation of these experimental observations by Meyer. From his observations, Bethelot had developed his theory of the formation of the substances contained in coal tar on the basis of: (1) The decomposition of the coal at a heat gradually progressing just up to redness; and (2) the prolonged action of a higher temperature on the products of this first decomposition. According as one or the other of these conditions obtains predominance in the carbonization of coal, the composition of the tar undergoes corresponding variation. Under the usual conditions of gas making, it is at a high temperature that tar is formed, and thus the constituents of the tar conceivably result from the mutual reactions of a very small number of compounds upon each other at this high temperature—according to Berthelot, to reactions between methane, ethylene, acetylene, and benzene. Thus benzene and methane, as Berthelot showed, give rise to toluene when the two constituent substances are in the nascent state, and can be caused to act upon each other at a comparatively low temperature. At a great heat a mixture of methane and benzene gave not toluene but anthracene. Hence the formation of toluene at a relatively low temperature of distillation may be taken as pointing to the existence in the coal of substances which yield benzene and methane together in the nascent state. Similarly the action of two molecules of methane on one of benzene gives rise to the various xylenes. Moreover, from Berthelot's observation of the formation of styrolene (cinnamene) from benzene and ethylene, of ethylene from hydrogen and acetylene, of styrolene also from benzene and acetylene, and of benzene itself from acetylene, the natural question arises whether in this series of creations of hydrocarbon substances the basic substance is not acetylene. Meyer's experiments on acetylene, conducted on a very much larger scale, went far to answer this question in the affirmative, to the extent also of accounting for the formation of almost all the substances in coal tar through the agency of the various transformations which acetylene undergoes in the heat. In the presence of hydrocyanic acid (prussic acid), pyridine and aniline were obtained; only phenol bodies being those the formation of which does not appear to follow from this series of changes.

Pursuing the train of thought aroused by reviewing these observations, M. Rouland insisted that such work as that of Berthelot and Meyer is synthetic, and therefore imaginative. However active the imagination of the experimenter, and however fruitful his work may prove, it must be kept in mind that such a system of investigation cannot, from the nature of things, replace observation of the raw material (coal), which is the root of the problem. Hence more modern investigators—such as Hart, Bedron, Leo Vignon, Pictet, and Ramseyer—have sought to attack the problem at the other end; endeavouring to identify various constituents of solid coal by the employment of solvents such as alcohol, ether, toluene, aniline, nitro-benzene, pyridine, quinoline, benzene, &c.—all bodies of very different chemical character and ranging in boiling point from 80° to 238° C. Experiments on these lines have been supplemented by ordinary distillation by heat, but under a greatly reduced pressure—a method which is far less precise, since it may provoke decompositions, even though the temperature at which it can be carried out is very much lower.

M. Rouland concluded by impressing upon his audience the fact that such experimental work, capable of revealing the real molecular constitution of coal, is still at its beginning. Scarcely anything had been accomplished which raised our knowledge of coal from the very primitive condition represented by percentages of the elements which composed it or by the conclusions which had been formed from experiments on synthetic lines. What was needed in France was a National Coal Institute, liberally endowed with money, equipment, and men. Why, he asked, should it be necessary in France, where such researches had their origin, to refer to enemy institutions, the very names of which were repulsive in the mind and on the lips? It was necessary to proclaim without ceasing that the inventor, in collaboration with capital, was the creator of wealth, and that lack of foresight was paid for even more dearly by nations than by individuals. There should be unity of effort between gas makers and the coal-mining industry for the establishment of such an Institute. When this was achieved, the Government could not withhold its support from it; for it was M. Rouland's belief that, after the conclusion of the war, greater interest on the part of the State would be shown towards societies which represented the production of wealth, and their efforts would be supported for the sake of the whole community.

An Investigation by M. Versepuy.

M. Rouland was followed by M. Versepuy, who, in the course of a paper on the same subject, also uttered a plea for closer investigation of the proximate composition of coals, and proceeded to indicate certain directions in which more economical use could, and should, be made of the fuel resources of France. In regard to the chemical characteristics of coking and non-coking coals, it was generally taken that the best coking coals were those containing 5 to 6 p.ct. of hydrogen, 10 p.ct. of oxygen, and 4 p.ct. of free or excess hydrogen. In practice, such coals were found to contain from 18 to 20 p.ct. of volatile matter. Yet numerous discrepancies were met with—*e.g.*, coals of very different quality had the same carbon content. He instanced a good coking coal with 86·4 p.ct. of carbon and a lean coal with 85·8 p.ct.; also highly agglutinating coal with 79·4 p.ct. of carbon, and somewhat lean coal with only 0·5 p.ct. more. On the other hand, among Newcastle coals, it had been found that for 100 parts of carbon, two non-coking coals contained:

Hydrogen	4·75	4·45
Oxygen	5·28	7·36

In three coking coals, these proportions were:

Hydrogen	5·49	5·85	5·91
Oxygen	10·86	14·52	18·07

In four non-coking coals, they were:

Hydrogen	6·34	6·12	6·40	5·99
Oxygen	21·15	21·13	22·55	23 42

From figures such as these, it was evident that, as regards the ratios of hydrogen and oxygen to carbon, there were as great differences among non-coking coals as among the coking coals.

Even with a particular coal the coking property varied according to the method of heating; certain non-coking South Staffordshire coals yielding a hard coke of good quality if suddenly brought to a high temperature in closed vessels—a species of change which recalled M. St. Claire Deville's production of crystalline chalk (marble) by heating and cooling ordinary chalk in a sealed receptacle. M. Versepuy urged that the study of the action of solvents on coal was necessary to the problems of the coking process. All the experimenters who had examined coal with the aid of pyridine and quinoline were agreed that, while the extract and the residue had the same percentage composition, the extract was "cokeefiable," while the residue was not. Of the attempts which had been made to convert a non-coking coal into one possessed of the coking property, M. Hennebute, in 1904, had suggested the addition of a cement compounded of hydrates of carbon to semi-coking coals, but with what success in practice was not known. M. Boudouard had shown that oxidation of coal, by increasing the proportion of humic acid, diminished the coking property.

M. Versepuy proceeded to insist on the necessity in France to coke coals which would coke. If the total output of a coal bed over a short period of time were analyzed, it would be found that, of good coking coal, 20,000 tonnes were used for gas and electricity, 40,000 tonnes for railway and transport, and 80,000 tonnes in metallurgy. In the last domain, a large proportion was consumed in the gas-producers for the Martin furnaces, for which some metallurgists sought to employ only coals having more than 25 p.ct, of volatile matter. Such practice was sheer squandering of the reduced national resources, if no other means existed for obtaining the requisite temperature in basic furnaces. Continuous working gas producers yielded a gas of from 800 to 900 calories per cb. m. By injection of steam, this figure was raised to 1300 calories, which was about the limit imposed by the cooling of the fuel through the decomposition of water.

The remedy was to be found in the use of a producer operated in alternating periods with air and with steam—viz., a water-gas producer yielding gas of 2600 calories—and by distributing the two gases by separate pipes to the bed of the furnace, so that one set of pipes served as igniter for the other in case of momentary stoppage of supply. This system had been applied at Toulouse for furnace heating with complete success. Metallurgists required to experiment with industrial gases of 1300 and 2600 calories, with water-gas as an auxiliary, in order to be able to utilize lean coals mined within a few miles of their own furnaces, instead of sending these coals hundreds of miles in exchange for gas coals which were considered indispensable for the basic furnaces.

With an apology for trenching on the field of another industry, M. Versepuy declared that economy of coal was a vital matter, and that the waste of it could not be laid at the doors of the gas industry, in which no portion of its valuable constituents was better utilized. In Germany, he continued, Martin furnaces were very frequently fed with lignite, and in southern France were lignite beds, which could be used without previous preparation; while in Germany lignites could never be employed, as they were converted into briquettes for use in the producers of steel furnaces. The demand by electric generating stations for special coals adapted to burn in certain patterns of boiler furnace was another instance of waste. In a brief reference to low-temperature carbonization, and the hopes which had been expressed of producing light hydrocarbons suitable for internal combustion engines by this method, M. Versepuy said that the cracking of the oils from the distillation of Scotch bituminous shales was a process which should be proceeded with in preference, if the increased production of petrol in the United Kingdom was a matter of importance.

Institution of Gas Engineers.—It has been decided by the Institution of Gas Engineers to combine the Gas Components Committee and the Gas Heating, Lighting, and Ventilation Research Committee under the name of the Gas Investigation Committee. The Gas Heating, Lighting, and Ventilation Research Committee will form the Research Sub-Committee of the Gas Investigation Committee.

Melting-Points of Fire-Bricks.—Mr. W. M. Barr, in "Industrial Engineering," states that the melting-points of 45 samples of fire-brick have been determined in an electric vacuum furnace; the temperature being measured with an optical pyrometer. The following melting-points (in degrees C.) were determined: Kaolin, 1740; pure alumina, 2010; pure silica, 1600; bauxite, 1820; bauxite clay, 1795; chromite, 2180; magnesite brick, 2165.

COMMITTEE FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

Second Annual Report.

THE Second Annual Report of the Government Research Department has been issued. The *précis* which accompanies it for Press purposes is worth reproducing as an introduction to a notice of the fuller document. It states that the new Research Department, under all the disadvantages of the strain of war and the shortage of workers, is trying to provide a permanent basis for research in this country and to co-operate with similar attempts in the Dominions.

The report indicates that there are three ways of organizing industrial research. The simplest is the case where a single firm can work out a problem, and itself fully exploit the results. In most cases, however, problems of industrial research will concern many firms—sometimes many industries; they will require the expenditure of large sums of money and the co-operation of many workers for long periods of time. But, if successful, the results will be of immense value. Most individual firms cannot undertake this long and costly process. Yet why should the State pay for the whole cost of winning new knowledge which will be valuable to business men? It is hoped the way out of the dilemma will be found by the establishment of "Trade Research Associations," to be constituted as needed for each industry or group of industries on which are, when possible, to be represented capital, management, science, and labour, and which are to be aided out of the million grant to be administered by the Department for the express purpose of establishing such Research Associations. One Association is just about to be constituted for the cotton industry; others are being brought into existence for the wool, flax, shale oil, and photographic industries.

There are also many cases where the problem is so complex, or else so immediately concerns the consumer rather than the producer, that co-operation between manufacturing firms is not possible. This is obviously the case with fuel. Hence the establishment of the Fuel Research Board which, under the direction of a distinguished man of science—Sir George Beilby—will itself conduct research. So, too, with the problems of fire-resisting materials and the determination of standards and constants. All this is direct work for the whole community acting through its special organ of research. It is interesting in this connection that the Royal Society has recently negotiated with the Department the handing over of the financial responsibility for the conduct of the National Physical Laboratory, where investigations of national importance are constantly going on.

The main lines of policy of the new Department are being slowly worked out. But it is also not neglecting immediately pressing problems. In glass, for instance, a great deal has been already done—three completely new kinds of optical glass have been discovered by Prof. Jackson. A research upon light alloys (aluminium, zinc, copper) will be of the utmost importance. Researches into the recovery of tin are expected to save the Cornish tin industry £30,000 a year. A large number of other researches are being aided or carried out by the Department.

The Universities will take their place in the new social tissue whose pattern is now being woven. At a considerable number, researches (aided or initiated by the Department) are now going on. At the Universities, too, the future research workers receive their training; and 36 (who would otherwise have drifted into some immediately remunerative work) were aided by grants from the Department in 1916-17.

The report ends by noting the altered attitude of manufacturers and men of business towards the claims of research and education, and reiterates the conviction that a sure advance in industrial science can only be made if the field of work is adequately surveyed beforehand, and an organized plan of attack worked out.

Lord Curzon's Report.

The report of the Advisory Council is prefaced by one signed by Lord Curzon, the Lord President of the Privy Council. In this, he refers to the fund of a million pounds which is to be spent over a period of five or six years; and, as already indicated, is to be expended on a co-operative basis. The Associations for Research will be established under the Companies' Acts, will be limited by guarantee, and will trade without profit. Contributions to such Associations will be allowed as a working expense for income-tax. The report mentions the transfer to the Department of the property of the National Physical Laboratory, together with responsibility for its maintenance and development. The scientific management will remain as hitherto in the hands of the Executive Committee under the chairmanship of Lord Rayleigh.

Mention is made of the appointment of the Fuel Research Board with Sir George Beilby as Director. Sir George, with marked public spirit, has accepted the post of Director, which, at his own request, will be without remuneration. The other members of the Board, who are also unpaid in this capacity, are: The Hon. Sir Charles A. Parsons, K.C.B., F.R.S., Sir Richard Redmayne, K.C.B., Mr. R. Threlfall, F.R.S. The Board will report through an Advisory Council; but it is the intention that it shall have executive powers within the limits of an annual budget approved by the Department. The Board has recently appointed an Irish Committee of Inquiry into Peat as a Source of Power. The Committee will meet in Dublin under the chairmanship of Sir John Griffith.

Regarding grants, approval has been given to aid in respect of 45 scientific investigations of industrial importance. Nine of these had already received aid during the financial year 1915-16; the remaining 35 were new proposals. Last year it was reported that grants had been approved to a number of individual students and research workers for the year 1916-17 to an amount not exceeding £6000. In the event, not more than £3550 odd was expended under this head upon 36 workers. Throughout, the work has suffered in amount owing to the war; and the Department were unable to expend more than £14,524 out of the £40,000 placed at its disposal by Parliament for the year 1916-17. During the current year £38,050 has been taken in the estimates, in addition to the fund of a million already referred to.

The Report of the Advisory Council.

The report of the Advisory Council (which is signed by Sir William G. M'Cormack, the Administrative Chairman) is an extensive document. It shows progress.

RESEARCH ASSOCIATIONS AND RESEARCHES UNSUITED FOR CO-OPERATIVE ACTION.

It first deals with the million fund for the Trade Research Associations. In an appendix, the Council give notes for the guidance of those desiring to draft the Articles for an Association, and a short statement of the conditions under which the Department would make grants to suit an Association when founded. [The report can be obtained for 3d., so that we will not attempt to summarize the information in this connection.]

As regards the constitution of the governing body or council of an Association for Research, it is obvious that capital, management, and science must have suitable representation. But the Council believe further that greater success and a wider scope of action will be attained, if provision is made also for the inclusion of labour. They think it important that the workers in an industry should be able to ascertain at first hand how science is applied to industry and how funds devoted to this purpose are expended, and that they should also be able to urge the importance of research which would result not so much in pecuniary gain as in the increased health and comfort of the workers. It is intended that the Research Associations should include as many of the firms in each industry as possible, but where there is so great a variety of applications as in the engineering industry, it may be found advisable to form a series of quite distinct Associations for research. On the other hand, it is quite possible that an individual great engineering firm having various activities of its own, might belong to two or three or more Associations. When it is found necessary thus to sectionalize an industry, it will be important for the several Research Associations to combine for purposes common to more than one. The Council have remarked that those industries which call for the most complex organization, and are most in need of scientific guidance, if they are to meet modern conditions successfully, are for the most part those in which the smallest progress has been made toward research on a co-operative basis. They refer to the large group of what may be called the chemical industries. At the one end of this group is found a growing movement toward financial combination—*e.g.*, among the highly developed heavy chemical and allied industries.

There are, however, important fields for industrial research which the Council can never hope to cover by means of Research Associations. Research into fuel is one of these. Every home in the land, as well as almost every industry, is directly concerned in the economy of fuel. For that reason it is simpler and more just that all should contribute through the taxes to the cost of the research. The Committee of Council have accordingly established the Fuel Research Board as a part of the Department. They hope to receive assistance if not contributions from some of the industries more immediately interested. The researches which are being conducted through the British Fire Prevention Committee and the Concrete Institute respectively into the fire-resisting properties and into the general physical properties of different kinds of concrete, are also cases which call for national action. The Council are assured that the same considerations hold good for the scientific problems underlying illuminating engineering. Where the conditions make it unlikely that any particular industry will undertake necessary research, it may be desirable for the Department to take action for the general good, with the help and assistance of the industries concerned. It will not be possible in these cases to delegate responsibility in the manner proposed for industries capable of combination in Research Associations. Far-reaching scientific investigations which are likely to affect several sections of the industry are accordingly more suitable for co-operative than for single-handed attack. There will still be ample room for private research by individual firms on the lines of their own special work. Indeed, they may be expected to gather many suggestions for this from the results of the co-operative investigations. On the other hand, the German chemical industry, with its powerful firms engaged in handling the primary raw materials through all their intermediate stages up to the manifold but closely related final products, explosives, dyes, essences, drugs, antiseptics, would not be suited for co-operative research, though it may be prepared to go far in the direction of financial fusion—a mere continuation of the previous line of development.

If, as in this country, conditions are in many respects specially favourable to co-operation in the conduct of research, the State is justified in encouraging development, the Council think, along these lines by means of monetary and other assistance. They find the justification for their proposals for Research Associations in these considerations. But when the firms have done all that it will pay them to do in the way of both private and co-operative research, there still remain lines of investigation which will either be sufficiently fundamental to affect a range of interests wider than any single trade, however large, or else they will clearly have a direct bearing on the health, the well-being, or the safety of the whole population. The two types are not mutually exclusive; but research of either kind falls, it is considered, into the class which must be undertaken by the State itself.

THE FUEL RESEARCH BOARD.

By far the most fundamental work initiated during the year, so far as the industrial aspect of the labours of the Council are concerned, has been the appointment by the Committee of Council of a Director of Fuel Research with a Fuel Research Board to assist him in laying

his plans. Under this head the report proceeds: The question of researches bearing on coal and its uses had been before the Council in various relations since the beginning of 1916. Definite applications for grants had been received from professional societies and from research workers at universities. A Committee of the British Association appointed to promote fuel economy had also approached the Council with a view to applying for a grant; and it became apparent at this early stage that the great range and importance of research into fuel called for treatment in a comprehensive way. A memorandum on researches bearing on coal and its uses was accordingly prepared in May, 1916, at the request of the Council, and with the assistance of Sir Richard Redmayne (Chief Inspector of Mines under the Home Office).

In July, 1916, the Reconstruction Committee appointed a Sub-Committee on Coal Conservation; and the Council accordingly referred to that Sub-Committee for their observations six researches that had been proposed to the Council. The Coal Conservation Sub-Committee, in a letter dated Aug. 11, replying to this reference raised the question of their relations with the Advisory Council and the manner in which "co-operation between the two bodies can best be assured." They also urged the importance and immediate necessity of arranging for a chemical survey of the coalfields. The letter continued:

> It appears to my Committee to be essential to the most economical use of our coal in this country, and to the most advantageous marketing of it abroad, that there should be available a collection of reliable data giving the chemical analyses of all our different coals. Further, it seems to be essential that these analyses should be prepared upon a uniform basis, so as to be readily comparable. My Committee are of opinion that it will be necessary to go even further than this, and to collect data not merely as to the chemical composition of the coal, but as to how the coal will behave under a furnace test, and upon its relative suitability to various processes—*e.g.*, coking, metallurgical, steam-raising, &c.

This letter led to a conference in September between representatives of the Coal Conservation Sub-Committee and of the Advisory Council, at which the relations between the Sub-Committee and the Council were discussed; and also the question of how to make the best use of the services of the British Association Committee on Fuel Economy. The conference agreed that the Advisory Council should be responsible for the organization and conduct of all research bearing upon coal, whether initiated by the Coal Conservation Sub-Committee or not.

The conference with the Coal Conservation Sub-Committee was followed by another with representatives of the British Association Committee on Fuel Economy. It was proposed that the Advisory Council should establish a Standing Committee on Fuel to advise them as to proposals for research into the uses of fuel; and it was suggested that the membership of the new Committee should be in a large measure identical with that of the executive of the British Association Committee. The Council accordingly appointed a small Sub-Committee on Nov. 3, "to consider the constitution, personnel, and terms of reference of the proposed Standing Committee on Fuel." In consultation with the Chairman of the Council, and having regard in particular to the chemical survey of the coalfields of this country proposed by the Coal Conservation Sub-Committee and to the important and difficult developments in which this survey was certain to result, the Sub-Committee reached the conclusion—

> That the magnitude and importance of the research work in fuel, which will have to be undertaken either on the initiative of the Coal Conservation Sub-Committee of the Reconstruction Committee or of the Council itself, makes it essential to set up machinery which will be at once both more compact and capable of more rapid action than would be possible if the ordinary procedure were adopted of reports from Standing Committees to be considered by the Advisory Council and then submitted by way of recommendation to the Committee of the Privy Council.

This finding was endorsed by the Advisory Council and in due course by the Government, with the result that the Fuel Research Board was established with a Director immediately responsible to the Lord President, and with power to expend funds placed at his disposal by the Committee of the Privy Council, in accordance with a budget annually approved by that body after report by us on his proposed scheme of work. We believe that all informed opinion will rejoice at the selection of Sir George Beilby for this important post and at his free gift of the knowledge and experience of a life-time of scientific study and manufacture to the national pursuit of an inquiry that he has made peculiarly his own. On the establishment of the Board, the services of Prof. Bone, F.R.S., of the Imperial College, were retained with the consent of the College Governors as Consultant to the Board. We understand that the British Association Committee on Fuel Economy is prepared to place the valuable information it has collected at the disposal of the Fuel Research Board, and that the Director may anticipate the active help of its members either in their individual or corporate capacity as occasion may arise.

The Fuel Research Board have already presented their first report outlining their proposals for taking stock of the coal resources of each district, classifying according to their qualities the seams which are being worked, or which might, in certain circumstances, be worked, and ascertaining broadly the industrial uses to which the different kinds of coal are being put. It is intended, with the help of the coal-owners, to collect typical specimens of the coal seams of the various coal mining districts, and to examine and classify them by means of chemical and physical examination in the laboratory. On the more theoretical side, it is intended to conduct investigations into the nature and origin of the various types of coal, and into the chemical and physical behaviour of their constituents under the action of heat and other agents, beginning with the well-defined types of coal as they occur in commerce. Thus this side of the inquiry will be most readily kept in touch with the practical side, and the new knowledge of the scientific worker at once becomes available for practical application. This method of attack needs the establishment of suitable machinery for the supply of samples, and not less the labours of a number of scientific workers. In present circumstances progress in both directions must be slow; but so far as more urgent necessities will allow, the Director and the Board will put this plan into operation during the coming year.

The Fuel Research Board have also had under consideration a number of proposals for the utilization of peat, and have been in communication with the Department of Agriculture and Technical Instruction for Ireland. That Department has for many years kept alive in Ireland an interest in peat and its possible uses; and the Board cordially responded to its advances in this matter. At the same time, the Board have not been able to ignore the experiences of the past and the failure of many schemes to attain permanent commercial success on any considerable scale. Accordingly they have decided, after consultation with the Irish Department, and with the approval of the Committee of the Council, to appoint a small Committee of Inquiry to sit in Dublin. [The terms of reference are set out.]

The appointment by the Government of a Director of Fuel Research has greatly facilitated and encouraged the co-ordination of the activities of the several Departments of State which are directly interested in the supply of fuel of different kinds, and their most effective use. A considerable portion of Sir George Beilby's time has been given in consequence to the service of the Admiralty and the Ministry of Munitions; while the Board of Trade have recently sought the advice of the Fuel Research Board as to the fixing of standards of quality for town gas. We have always believed that the natural relation of ourselves and the Department to other Government Departments would be to act as the servant of them all, to supply accurate information and independent reports upon scientific problems submitted for investigation, and to leave to the administrative departments the duty of applying the knowledge we may be able to furnish. This proves to be the direction in which events are moving; and the appointment of Assessors from other Departments to our Council has undoubtedly helped to bring it about.

The work of the Fuel Research Board has been in the main preparatory. Neither body has yet done much in actual research, for they have been doing the careful thinking without which ideas are barren.

Domestic Heating.

The Council have, however, recommended that grants should be made for three pieces of research which are related to the work of the Fuel Research Board; and the Board have concurred, because they could be carried out without interfering with the general plan of operations. The first of these, initiated by the Sanitary Committee of the Manchester City Council, is being carried on at the Municipal School of Technology, and has for its objects the use of better methods of domestic heating and improvement in the ventilation of dwelling rooms. A grant has also been given to the Institution of Heating and Ventilating Engineers to enable them (*a*) to tabulate and print the result of five researches on domestic heating carried out at University College, London, during the past three years, (*b*) to carry out a research with a view to establishing co-efficients of heat transmission through standard building materials, and (*c*) to conduct an investigation on heat transmission from radiators. The Council have invited the Institution to add Dr. Lees to the Committee of Direction; and as a member of the Executive Committee of the National Physical Laboratory, he will assist them to avoid overlapping between the work to be done at University College and that conducted for some time past at Teddington into heat transmission through building materials of a light character.

Atmospheric Pollution.

The third grant made this year in the ultimate interests of fuel research will secure the continuance of the work begun in 1912 by the Committee for the Investigation of Atmospheric Pollution. The Committee has now been constituted a Committee of Advice to the Meteorological Office; and that office will become responsible for the expenditure of the grant and of other income available for the investigation. The grant is made subject to the condition that the number of local centres at present reporting to the central control station shall be maintained. With the consent of the President of the Local Government Board, the Council invited Mr. W. S. Curphey, the Chief Inspector of Alkali Works, to join the Committee of Advice. The collection and tabulation of careful records as to atmospheric pollution in different parts of the country should be extended after the war, and the statistics should supply in the future one of the means of gauging the work done by the Fuel Research Board in promoting methods of smokeless combustion.

Miscellaneous.

The report deals with many other subjects of more or less indirect interest to our readers. Reference is made, among much else, to what is being done in connection with research in glass manufacture, to the surveys that are being instituted into other fields of research (including metallurgy), and to the surveys of resources.

Refractories.

In a second part of the report, the Council allude to a number of investigations to which they have rendered aid—among them "Refractories." In this connection they say:

The Institution of Gas Engineers have long supported a research under Dr. Mellor into refractories, conducted at the Central School of Science and Technology at Stoke. The growth in this work has led the authorities of the school to approach the Department for aid towards the cost of a much-needed extension of their laboratory for refractories. The Council view the work of Dr. Mellor in this field with much sympathy; and they recognize that the problems connected with refractory materials call for greatly increased attention. Indeed, the matter is of such wide interest that a Refractories Conference has recently been summoned on the initiative of the Faraday Society at which no less than thirteen societies and bodies were represented, with a view to working out a co-ordinated scheme of attack on a national scale. The Council agree that nothing less comprehensive would be satisfactory, and await with great interest the proposals likely to be formulated by the conference. Any scheme to be satisfactory must find a proper place not only for the work which has so long been carried on at Stoke, but also for that more recently begun with valuable results at the National Physical Laboratory, as well as for that in contemplation at Sheffield and elsewhere. This problem affords an excellent example of the need for well-considered action. Refractories are a vital necessity for many difficult laboratory investigations, and in many diverse

industries. The difficulties to be overcome are too many and too varied to be adequately dealt with in one place or by a single group of workers. The need for co-operation and for the assignment of the proper work to each is obvious.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Report of the Council for the Year 1916-17.

(*Concluded from p.* 378.)

WORK OF THE TECHNICAL COMMITTEES.

Having regard to the prevailing conditions last year, the Technical Committees of the Association have accomplished a good deal of work.

The Committee upon "Pipe Questions" last year collected the answers to a series of questions on the use of cast-iron, wrought-iron, and steel pipes, and published a summary of them as an appendix to its report. Many communications have been received from members in regard to suggestions and views given in this appendix. It was intended to prepare a critical report from the whole of the material available; but, while the Committee met twice with this object in view, it has been found impossible to give the necessary time for its completion, which must now be deferred until the war is over. Meantime, the President will be glad to receive further communications on the subject.

The "Instructions for the Fitting and Manipulation of Gas Heating and Cooking Apparatus," which were approved at last year's general meeting, have been printed and distributed. Members are desired to give these instructions as wide a circulation as possible, especially among state and municipal authorities. These instructions allow of the use of flexible connections to small movable burners, &c., provided there is a tap on the supply side of the connection, and the nozzle to which it is fitted is at a proper angle and position to obviate any sharp bending or kinking of the connections. The spread of the use of gas recently in circles unaccustomed to it, and to the want of the necessary care in the use of gas appliances, has led to a number of accidents through the flexible connection sliding off the nozzle. Herr Jäckel, of Plauen, has pointed out that the nozzles supplied by the various makers differ greatly one from the other in shape and dimensions; and he has suggested that the nozzles should in future all be made to standard pattern and size. These have been approved by the Council and are given in an appendix to the report.

The Association instructional and experimental works has had its information bureau kept busy with technical questions, to which answers have been given without fee provided they did not necessitate special research. Such questions have been dealt with since the outbreak of war at the Duchy of Baden Chemical-Technical Testing and Experimental Works; while scientific problems have been handled at the Chemical-Technical Institute of the Carlsruhe College. A large number of routine analyses have been carried out, and one or two trials of new plant at works. Some technical-scientific investigations have been completed, and others are in progress on the heat balance of ammonia compressing plant, and heat balances of various types of gas making plant. Other subjects upon which investigations have been finished include "The Determination of Nitrogen in Coal and Coke:" "The Formation of Iron Carbonyl in Compressed Coal Gas for Railway Carriage Lighting;" "Rendering Coal Gas Non-poisonous;" "The Supply of Secondary Air and the Course of Combustion in Inverted Gas-Burners;" and "Investigations on the Explosive Limits of Mixtures of Gas and Air, or of Gas, Oxygen, and Nitrogen." Also a large number of investigations have been made in regard to problems arising from the shortage of coal and gas due to the war.

While the holiday course of instruction for gas engineers, which had been provided annually from 1898 until the beginning of the war, has again been suspended, two eight-week courses of instruction have been held for foreman-fitters who had been wounded at the front. The purpose of these courses is to give the men a thorough grounding in their own vocation as applied to the gas industry, and to train those most suitable to become laboratory assistants. The course includes lectures on the valuation of gas coals, the efficiency of furnaces, and the general properties of gas and the phenomena of combustion, with practical exercises in the laboratory, and later on the gas-works, on the examination of fuels and the bye-products of gas manufacture, analyses of flue gases and coal gas, the determination of calorific power, and photometry. It is intended to repeat this course, and to initiate a course extending over several terms, for training incapacitated officers as illuminating engineers, gas engineers, and chemists for coke works.

The "Photometric Committee," under the chairmanship of Professor Eitner, had pursued its work of preparing rules for photometry in relation to new problems, and has brought it to a conclusion. Another matter has claimed the attention of this Committee. A conference was arranged at a joint meeting of the German Illuminating Engineering Society and the Architects' Association with the object of promoting co-operation between lighting engineers and architects. The Chairman of this Committee attended meetings of the Council of the German Illuminating Engineering Society held on Dec. 16 and Jan. 13 last, which resulted in the appointment of a new Committee to keep in touch with architects and to deal with lighting questions in conjunction with them. This Committee, which is known as "Committee IV., on Practical Lighting Questions," consists of Herren H. Lux (Chairman), Bloch, Bechstein, Dreschmidt, Eitner, Halbertsma, Lempelius, Meng, Monasch, Norden, Schumann, and Wedding. The Committee met on Feb. 3 last, and drew up rules for its procedure, which are open for comment and the suggestions of members of the Association. The questions with which the new Committee has to deal are of extreme and far-reaching significance to the gas industry, and will bring many new and very interesting problems before the Association's Photometric Committee, which it will not be possible, however, to deal with properly until after the end of the war. The Committee have issued in the year 22 lbs. of amyl-acetate for photometric use (in the Hefner standard lamp) and 28½ litres of palladium solution for detecting leaks in gas supply systems.

The "Water-Works Committee" reports that the volume of statistics for the year 1915 embodies returns from only 286 works, as compared with 415 in 1913 and 378 in 1914. It is hoped later to obtain returns from the works which have been unable to send them hitherto (owing to depletion of staffs) and to publish them in a supplement to the present volume. The Committee have decided for future issues to Germanize a number of terms of English, French, or Latin origin which have hitherto been used in these returns (such as centrifugal, plunger, differential, expansion, horizontal, étage, circa, à, and pro) by substituting for them words of purely German derivation. Obligatory re-testing of water meters forms the subject of an appendix to the report, prepared by Herr Götze, of Bremen. Answers to a circular of eighteen questions as to the effect of the war on the operation and development of water-works have been collected and put in the hands of the President of the Association.

Dr. F. Scheelhaase, of Frankfort, and Herr Terhaerst, of Nuremberg, compiled in the preceding year a report on, and rules for, the connecting of lightning conductors to water and gas pipes; and in view of the prohibition of the use of copper for lightning conductors, Dr. Scheelhaase has now prepared temporary rules to be followed while war conditions continue. These rules are reproduced, with the ordinary rules, in an appendix to the report. The Association have also nominated Dr. Scheelhaase to serve as their representative on a Joint Committee of a number of technical institutions, formed at the instance of the German Electrotechnical Association, to deal generally with the question of lightning conductors, especially in regard to agricultural buildings.

The Association have joined the Union of Technical-Scientific Associations which was formed last year, by co-operation of the German technical institutions representing engineers, architects, ironmasters, chemists, electrical engineers, and shipbuilders. The Association's delegates to this Union are Herr Hase, Prof. H. Bunte, and Dr. von Oechelhaeuser. The Union is a pan-German organization intended to deal with questions of legislation, agreement on fundamental technical matters, technical instruction, and all questions connected with technology, and to be at the service of State and municipal authorities, as well as all circles of the community. Particular branches of the general work of the Union will be dealt with by Special Committees, on which representatives of the Association will serve.

The thirty-seventh volume of Gas Statistics, relating to the year 1915 (or the financial year 1915-16) has been issued, and contains returns from 385 undertakings. Only 65 of these report a slight falling off in gas consumption; the remainder show for the most part a quite considerable increase.

MEMBERSHIP ROLL.

The Association have lost six members by death during the year. There is a net gain in membership of all classes of nine in the course of the year—there being 1070 members at its close.

Thanks are expressed to the subscribers—a goodly list—to the Association's Fund for Scientific Objects. Among the names in the list are: The Gas Company, Berlin (which is presumably the German Administrators of the Imperial Continental Gas Associations Works in that city); the Gas-Works of the same Association at Hanover; the Frankfort Gas Company, and the "Gas-Works Company" at Strasbourg, which presumably is the German Administration of the French Company's works there.

DISTRICT ASSOCIATIONS.

The reports of the affiliated District Associations which are embodied in this annual report may be briefly summarised:

The Brandenberg Association of Gas, Electricity, and Water Engineers abstained, in view of the war, from holding their annual meeting as usual in March, and will either merely meet for the transaction of formal business at the time of the meeting of the parent Association, or will hold an autumn meeting. The year closed with a roll of 3 honorary and 183 ordinary members.

The Mid-Rhenish Gas and Water Engineers' Association met, for the first time since the outbreak of war, at Mannheim, on Sept. 23 last, under the chairmanship of Herr Göhrum, of Stuttgart. The proceedings were of the nature of an informal discussion on war influences; the points dealt with including the sale of gas on credit terms, measures of defence against air attacks on gas-works, and through retorts for moderate-sized and small works. In the afternoon, an inspection was made of the new

plant at the Ludwigshafen Gas-Works. This District Association had 247 members of all classes at the date of the meeting.

The Association of Gas and Water Engineers of Silesia and Lusatia held their forty-sixth annual meeting—the first since the outbreak of war—on Aug. 5, 1916, at Bad Reinerz. The papers read and discussed included: "The Importance of Gas-Works' Products for the Supply of Raw Material in Germany in War and Peace," by Herr Ohly, of Cologne; "Experiences with Coke Breeze as Fuel for Boilers with Undergrate Blast," by Herr Kayser, of Cologne; and "Artificial Desiccation in Relation to Important Food Questions of the Time," by Herr König, of Breslau. There was a discussion on the Presidential Address of Herr Hase to the parent Association the previous June, and an informal discussion on gas and water matters. The Association had 174 members of all classes on June 1, 1916. It was decided to hold the next meeting at Königshütte, in August, under the chairmanship of Herr Hofmann, of Oppeln.

The Association of Gas, Electricity, and Water Engineers of the Rhine Provinces and Westphalia held two meetings, which were well attended. The first was at Aix-la-Chapelle, on Sept. 23 last, when a paper by Herr Brüggemann, on the "Significance to Gas and Electricity Works of 'Summer Time' during and after the War," was read and discussed. At the second meeting, at Cologne, on March 3, Dr. Markgraf, of Essen, gave a lecture on the "Use of Coke in place of Coal for Industrial Purposes," and Herr Ohly presented a report on the "Army and Navy Requirements of Gas-Works Bye-Products, and the Effect of Sequestration Orders on their Prices," which led to a lively discussion. The Association had a membership roll of 367 on April 1 last. The Chairman for the ensuing year is Herr Rosellen, of Neuss.

The Bavarian Association of Gas and Water Engineers held their thirty-second general meeting at Würzburg on April 30 last, under the chairmanship of Herr Finkler, of Neukölln. Herr Zimpell, of Würzburg, gave an account of the local gas-works, and the following papers were then read and discussed: "Gas-Works and Coke-Ovens," by Herr Menzel, of Berlin; "Present Industrial Position of Gas-Works," by Herr Ohly; and "Peace Aims of Gas-Works after the War is Over," by Herr Gareis, of Bonn. It was decided to hold the next annual meeting at Traunstein.

The Baltic Association of Gas and Water Engineers held their forty-fourth annual meeting in Berlin on June 28 last year, in connection with the general meeting of the parent Association. This district Association has 175 members.

The sixty-fourth general meeting of the Association of Gas and Water-Works Engineers of Saxony-Thuringia was held at Leipsic on May 19 last, under the chairmanship of Herr Weisskopf, of Chemnitz. Herr Jäckel, of Plauen, presented a report upon the "Supply of Coal to Outlying Places," and Herr Ohly gave a lecture on the "Future Industrial Position of the Bye-Products of the Gas Industry." After a long discussion on various gas and water topics, it was decided to hold the next general meeting at Halberstadt.

The Lower-Saxony Association of Gas and Water Engineers held their sixteenth annual meeting at Altona on Sept. 23 last, under the chairmanship of Herr Pippig. No meetings had been held for two years previously; and the Chairman's address gave a review of the progress in gas and water supply during the past three years.

CENTRAL GAS PUBLICITY BUREAU.

The Central Gas Publicity Bureau, which after some years of propaganda work on an independent footing, has now become affiliated to the Association, held its statutory meeting of members on March 17. Its work has deviated during the past year from its usual objects. It has been much occupied with the demands on the gas industry which the war has called forth. War conditions have, however, in themselves provided a magnificent propaganda for gas, as is evident from the increases in the consumption of gas and in the number of meters in use which the monthly statistics collected and published by the Bureau have shown during the year under review.

The Bureau has extended its educational campaign by issuing two pamphlets—viz., one on "How to Prepare Meat, Fish, and Other Food in its own Juice only and without the Addition of Fat," the other, by Fräulein Rauschenbach, gas demonstrator at Weisbaden, on "The Use of Gas for Drying or Desiccating Fruit, &c." The Bureau has published information on the advantages of gas as a fuel in communal kitchens and in bakehouses. The Bureau has also collected particulars of the increases in the price of gas which war conditions have compelled gas undertakings to make. The information thus collected is at the disposal of gas undertakings needing it.

The Bureau, having its offices in Berlin, was in the best position to negotiate on behalf of the gas industry with government authorities in regard to questions of the supply of raw materials on which restrictions had been placed. Since the outbreak of war, the Bureau has also ascertained the coal requirements of German gas-works, and has negotiated with the authorities in order to ensure an adequate supply to all works. It is still in constant communication on this question with the newly-constituted Imperial Commission for Coal Distribution, and hopes that a satisfactory solution may again be found of the question of coal supply to gas-works which is still in suspense. As the whole of the staff of the Bureau, with the exception of the Director (Herr Lempelius) and the Registrar, was called up, its far-reaching work has been carried on with some difficulty. Its activities necessitate constant communication with almost every German gas-works. It was this latter circumstance which directed attention to the desirability of closer co-operation of the Bureau with the Association; and, after considerable discussion, the necessary modifications were made in its statutes to admit of its becoming affiliated to the Association in the same way as the various District Associations.

GAS AND MOTOR FUEL PRODUCTION COMBINED.

In the final portion of a lengthy paper on the "Thermal Decomposition of Hydrocarbons" submitted by him to the American Gas Institute, Mr. E. H. LESLIE deals with the combined production of gas and motor fuel.

The author says that the great demand for gasoline in recent years, due to the rapid increase in the use of explosion motors in pleasure and industrial cars, has placed a premium on this product. The fact, too, that the great petroleum fields developed in late years, with the exclusion of certain Oklahoma and Wyoming districts, have been small producers of gasolines, has also made the motor fuel situation more critical. The result has been the development of two types of processes for the synthetic production of gasolines.

The first of these is the liquid-phase cracking process for heavy oils. The oil is introduced into a pressure-still and distilled slowly under 75 to 100 lbs. pressure. The lighter distillates are not amenable to such treatment, on account of their exceedingly high vapour pressures. If the temperature of an oil of kerosene grade, or even gas-oil grade, is raised to the initial cracking temperature in the neighbourhood of 360° C., the pressure for its confinement in a still is several hundreds of pounds—in fact, entirely incompatible with safety, when it is considered that a large still full of liquid is under treatment.

This state of affairs has led to the development of another type of process, the so-called vapour-phase processes, in which an oil is first vaporized, and then passed through a zone heated to a temperature of 500° to 600° C. The methods of Rittman, Hall, and Greenstreet are the best-known examples of vapour-phase processes.

Incidental to the formation of gasoline by these vapour-phase processes, a considerable quantity of a very rich gas is produced. With certain oils a furnace dealing with 500 barrels of oil per day produces 100,000 to 200,000 c.ft. of very rich gas per 24 hours. The composition of the gas depends on the nature of the oil; but contains 65 to 45 p.ct. methane and ethane, 30 to 40 p.ct. ethylene and propylene, and 10 to 15 p.ct. hydrogen. Its calorific value and candle-power are both high; and it would be a very suitable gas for the enrichment of blue gas or other poorer gases, such as high-temperature coke-oven gases.

It has often occurred to Mr. Leslie that the synthetic gasoline interests and the gas interests ought to work together, since the one provides what the other so much needs. This is particularly true from another viewpoint. The oil which is now sold for the carburetting of water gas is an intermediate cut between the burning oils and the spindle oils. It is eminently suited for cracking purposes and synthetic gasoline production. The vapour-phase cracking methods are as yet too little developed to exert any great influence; but their development is coming rapidly, and with it will come an increase in the value of so-called "gas-oil."

From the standpoint of the petroleum refiner, it is uneconomical to burn such a rich gas as the synthetic gas from his cracking processes. This is especially true in the natural gas fields, where a good gas is obtainable at 15 c. per 1000 c.ft., or in the coalfields where good soft coals are available in quantity. It seems, therefore, that it is logical, both from an economical and practical standpoint, for those who are interested in gas and those who are interested in gasoline to work together.

Trade Fallacies.

A series of articles dealing with the subject of trade fallacies, which have during the past couple of years appeared in the pages of "Land and Water," have now, after being revised and in some cases added to, been published in book form, at the price of 5s. net, by Messrs. P. S. King & Son, Ltd., of Orchard House, Westminster, S.W. 1. The author of the articles [which comprise a criticism of existing methods and suggestions for a reform towards national prosperity] is Mr. Arthur Kitson; and the book is presented with a preface by Mr. Francis Stopford, the Editor of "Land and Water." In this preface, a warning that they will be well-advised to forswear the volume, as their prepossessions will be shocked, is offered to those who are satisfied that British currency and banking, and her trading and industrial conditions, are all that they should be. This gives a good hint of the trend of the opinions which Mr. Kitson expresses; and to it we will merely add one of the main reasons which Mr. Stopford states decided him to originally accept the articles for publication—that the opinions were set out in such clear and straightforward language that a subject usually regarded as too technical and dull for a journal that caters for general readers, became not only comprehensible, but always interesting, and often fascinating. There are chapters on labour, capital, and the State; the coming trade war; State control of industries; and the psychology of the workshop. We are in hearty agreement with Mr. Kitson in the importance that he places, from an economic point of view, on the well-being of the working classes.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Low-Temperature Fiasco.

SIR,—I read with interest your leading article and Mr. John West's instructive letter giving definite working results of high and low temperature carbonization.

In common with other gas undertakings, we received from the Ministry of Munitions and the National Gas Council some instructions on the subject of increased tar output; and I at once went into the possibility of meeting their demands.

After giving this matter careful consideration, I concluded that any alterations in the system of working at the Macclesfield Gas-Works would result in a reduced total output of tar from the plant, since we are now obtaining 16 gallons of tar per ton of coal carbonized.

I do not know of any gas engineer who is in a position, unless he has had extensive experience in low-temperature practice, to make a definite statement as to the probable cost of working his plant so as to get only 9000 c.ft. of gas per ton.

Being desirous of obtaining as much assistance and information as possible, I communicated with the National Gas Council, giving them an average return of the tar produced per ton in last year's working, and the improved results with steaming—both, of course, with high-temperature carbonization. I also pointed out at the same time that it appeared to me that we were achieving the object which the Ministry presumably have in view, and without jeopardizing the position of the gas undertaking. I welcomed the offer of the National Gas Council to send an Inspector to discuss this subject on the spot; but, from their reply, I gather that the matter is postponed.

Prof. V. B. Lewes in his book on the "Carbonization of Coal" (p. 162) gives a table showing that with a temperature of distillation of 700° C. (1292° Fahr.), the output of gas would be 9000 c.ft. per ton with 15 gallons of tar of a specific gravity of 1·140. Taking these figures as a basis, I have made an estimate of what results I might expect if the plant were operated at this low temperature. This estimate is shown in the following table:

No. 1.—*Daily Output with Sixteen Retorts in Use.*

	Present Methods.	Low-Temperature Carbonization.
Coal carbonized per retort . . .	2½ tons	1¼ tons
,, ,, ,, day	40 ,,	20 ,,
Tar made per ton	16 gallons	15 gallons
,, ,, ,, day	640 ,,	300 ,,
Total make of gas per day . . .	630,000 c.ft.	180,000 c.ft.

No. 2.—*Daily Output with Whole of Plant in Operation.*

	Present Methods.	Low-Temperature Carbonization.
Coal carbonized per day	80 tons	40 tons
Tar made per day	1,280 gallons	600 gallons
Total make of gas per day . . .	1,260,000 c.ft.	360,000 c.ft.

It will be seen that the output of tar from the plant per day will be less than half the present output.

It is further apparent that, with low-temperature carbonization, it would be impossible to meet the demands of consumers unless the plant were doubled, which is, of course, out of the question at the present time.

Is it not due to the gas profession that they should now be informed of the reasons why such a drastic proposal was put forward apparently without proper consideration?

J. E. BLUNDELL.

Macclesfield Corporation Gas-Works, Aug. 30, 1917.

Great Expectations at Low Temperatures.

SIR,—The results of carbonizing tests at different temperatures that Mr. John West published in your columns last week are very valuable; and he has placed the gas profession under a debt of gratitude to him (the same applies to your leading articles on the subject) for giving the members some reliable information as to the actual effects of following the official direction for amplifying (?) tar production, which direction was, it seems, readily swallowed, digested, and endorsed by the Executive Committee of the National (or, as I have heard it called, the Irrational) Gas Council. There is one satisfaction about the position, that commonsense in the matter was soon restored to its rightful position, through representations made by those who knew, and by the eye-opening extra cost of the retrograde proposal—retrograde for all the purposes of the Ministry of Munitions and of that patient pack-horse which delights in pursuing its onerous career under the dignified title of the gas industry; its greatest display of industry at the present time being in struggling along with its accumulated burden with the desire uppermost in its mind to see how long it can keep to the road and the load before reaching perdition. This would have come quickly enough with low temperature on top of all the rest.

Let us see. There are, according to the circular-letter I received, seven gas engineers on the Executive Committee of the Council, ten other gas engineers and managers were co-opted to help with their shoulders (and presumably brains), and a largely attended meeting of representatives of gas undertakings appear jointly to have accepted responsibility in what you, Sir, last week described as "The Increased Tar Production Muddle." The position is inexplicable with the galaxy of gas engineering talent that, it may be supposed (unless action was taken without the consent of the engineers), stood guarantee for the soundness of a recommendation which has revealed itself as possessing a very large vacuity. It is hoped these gentlemen were among the first to readjust official misconception. There has been some amount of money loss through the desire to be further patriotic, though patriotism was better served in the event by those gas engineers who are, as our theological friends would say, possessed by "plenary inspiration." But what about those who have thrown the dice and lost? Perhaps they ought to have known better. Perhaps they resigned themselves to their fate with the thought "Our's not to reason why, our's but to do and——." Of course, they hope to live; but they are asking among themselves, "Shall we get compensated for our losses?" Perhaps they will not care to disclose themselves as among those who were so enthusiastic that they proceeded innocently and faithful to command to incur losses. Perhaps they will not care for this so long as they can obtain recompense. But did they notice that usefully protecting word "approved" which looks like having been designedly placed in the phrase "to pay to *approved* undertakings." If not, then they will see that their claims, without their undertakings were "approved" before work started, have a good chance of finding their destination in the capacious departmental waste-paper basket. So much for that point, which does not give great hope.

There are one or two questions now I should like to put to Mr. West about his figures. The first is as to the relative calorific power of the gas when carbonizing coal at high and low temperatures. The gas of low-temperature birth does not come up to my anticipations in view of the temperatures and the gas yields from the same coal. Look at Table I. I should have expected that, carbonizing at 1793° Fahr. and making only 7272 c.ft. per ton, a higher calorific value would have been realized than 479 B.Th.U. from a coal that at 2562° Fahr. gave 11,491 c.ft. of 441 B.Th.U. That must have been a freakish sort of coal—in fact Mr. West describes it as of "poor quality;" and this can easily be believed. But in the next table we have a good quality coal, and something that makes one's sympathy go out to medium temperature carbonization, because its reputed ability to heighten the calorific power appears here to be grossly slandered, if my old friend Lewes (I wish he were here now to take part in the present discussion), Marshall, and others knew and know anything of what they have talked about. For see, Mr. West tells us that when carbonizing at 2120° Fahr. and making 13,387 c.ft. per ton from this good coal, he found a calorific value of 523 B.Th.U. Now that calorific value is 55 B.Th.U. *less* than when he was making from the same coal 512 c.ft. more, by carbonizing it at a temperature 439° Fahr. higher. Have the calorific figures got accidentally reversed? The comparison as given by Mr. West is—

Temperature.	Make per Ton.	Calorific Value.
2559° Fahr. ..	13,899 c.ft. ..	578 B.Th.U.
2120° ,, ..	13,387 ,, ..	523 ,,

I should like an explanation of the variation from expectation.

Then there is an omission from Mr. West's letter. He does not give us the analyses of the tars from the different coals as produced at the different temperatures. He will help us gas men to interpret his figures better if he will remedy the omission. Of course, this will not affect his point as to the total output of tar in relation to time and plant as distinguished from the make of tar per ton of coal.

As to the last table, I should like some explanation as to how it is that steaming effects such an increase as is shown in the amount of tar produced, with an analysis of the tar with and without steaming. I do not question the increase; I only want information.

As I desire to retain my berth, Sir, will you, for publicity purposes, allow me to subscribe myself as

NOTANDA.

Aug. 31, 1917.

Ideal Carbonization—The Race for it.

SIR,—The interest is deepening into most profitable knowledge towards what the late Prof. Vivian B. Lewes termed "Ideal Carbonization."

The questions involved, requiring their correct answers, are gradually cornering the systems which have not carbonized—nor ever possibly can carbonize—coal to yield anything like what is really contained in it.

Indications are at hand that we are possibly approaching the maximum volume of gas carrying its highest burden of hydrocarbon content, safeguarding the preservation of its limit in heat value, and attaining a substantial increase in flame temperature, without in any way impoverishing the quality, weight, and measure of the bye-products—thus bringing us nearest to the full solution of the title of a book: "A Ton of Coal and What we Get from it."

By some fortune—through a period of sadness forcing circumstances to meet urgent necessities—vertical retort carbonization has come into its undoubted own, in that the distillation of coal in the ascensive is yielding, and maintaining, by far the largest volume of gas per ton of coal carbonized.

The war has taught us (and will continue to teach for years to come) that we must not waste anything; and one of the greatest blessings that could possibly come to our country would be the utilization of heat in nothing but gaseous form, thereby extending by a few hundred years at least the life of the coal age of Great Britain.

We must, however, drop out of use all crude and murderous methods of firing with raw coal. The figures are appalling as between the best to be done and the worst, which latter we have hitherto preferred and favoured the most.

Time with its demands has created opportunities in which vertical retorts are showing their superiority over the "lying down" systems of carbonization. For some months now trial tests have been running with intermittent verticals under special steaming of gas charges; and some remarkably good results have been obtained and maintained. These trial tests are still in progress; and when completed the results will be given for publication.

When a volume of gas per ton of coal carbonized approaching in total heat value upwards of 9,000,000 B.Th.U., with nearly 37 p.ct. of

hydrocarbon content, and less than 5 p.c. of inert gases can be obtained, the question naturally arises, Why has it not been done before?

There is a phrase "It is passing strange." Yet so far back as 1903-4 the Settle-Padfield process at Exeter gave continuously from 50 to 55 p.c. of hydrocarbon content. The system, however, was without war conditions to assist it.

T. SETTLE.

Truro, Sept. 1, 1917.

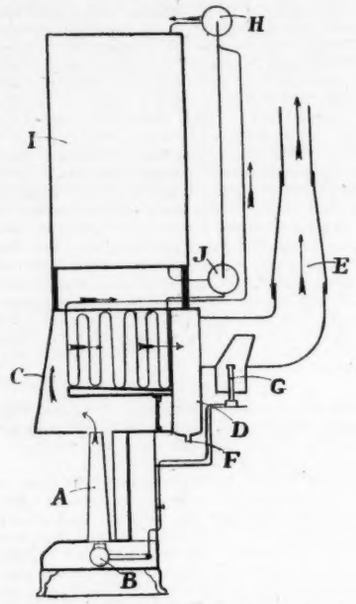
REGISTER OF PATENTS.

Gas-Heating Apparatus.—No. 106,468.

SOCIÉTÉ DU GAZ DE PARIS (Soc. Anon.), of Paris.

No. 2220; Feb. 14, 1917. Convention date, May 19, 1916.

This gas-heating apparatus comprises "a receptacle containing water arranged in such a manner as to be heated by convection by the products of combustion—the heated water passing into a radiator, where it disposes of its acquired heat by radiation and then returns to the heating receptacle, thus completing a closed circuit."



Society of Gas, Paris, Gas-Heating Stove.

A is refractory material rendered incandescent by the flames from the burner B. The products of combustion pass through the heating body C containing tubes filled with water, then through a flue D, and escape into the outlet passage E after losing the greater part of the water they contained, which collects in the bottom of a box, to be removed through an opening F. The absorbing surface above the refractory material is separated from it by a double plate of refractory earth or other bad conductor of heat. At the base of the passage E is installed an auxiliary burner G, surrounded by a chimney supplied with air through adjustable openings at its bottom. The hot water, after circulating in the heating body in C, passes to a collector H, then into a radiator I, which forms the radiating surface. From this the water passes to a collector J, and returns after describing a closed circuit.

The patentees do not claim as novel, *per se*, in a gas heating apparatus to cool the combustion gases down to the condensation temperature of the water vapour they contain and then to apply additional heat thereto to facilitate their discharge through a chimney or the like, since this is disclosed in their prior patent No. 11,502 of 1915.

Extracting Volatiles from Coal, Shales, &c. No. 107,824.

BUSSEY, C. C., of Brooklyn, New York, U.S.A.

No. 10,003; July 17, 1916.

According to this invention, the materials having hydrocarbonaceous ingredients are contained in a shaft or cupola, and a heating agent is passed through them; being produced by burning the material in the lower end of the charge after the volatile constituents have been extracted—the temperature of the heating agent being maintained at a predetermined degree of heat and the material moved through the apparatus by continuously removing the residue from the bottom, so bringing fresh material into the lower end of the charge.

The temperature of the gas is maintained within the retort at 800° Fahr., "so as to extract the desired amount of volatiles from the materials without producing any chemical change in them—that is to say, without producing breaking-down actions in the gaseous constituents while the volatiles are being extracted."

In order to effect a free and uniform expansion of the materials throughout the retort, and also in order that the producer gas may be evenly distributed, it is preferred to carry out this method under a partial vacuum. An exhauster is employed to create this, and also to act as a means for assisting in removing the mixed producer gas and volatile matters from the retort.

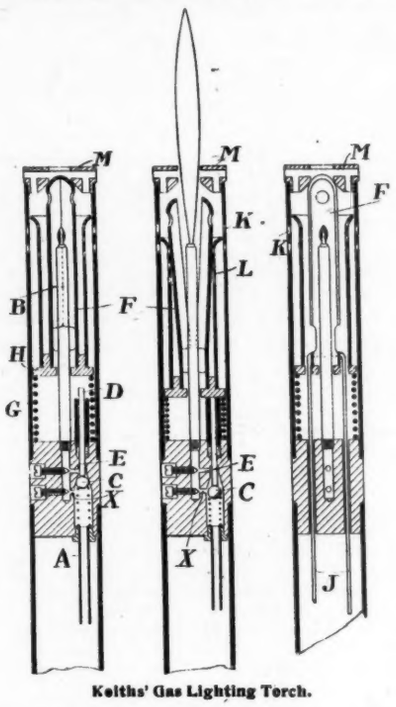
The patentee says he is aware that it has been proposed to employ a gas generator in connection with a still for extracting the volatile substances from hydrocarbonaceous materials without creating breaking-down actions in the gaseous constituents; and in this connection an apparatus has been proposed, in which gases from a generator are passed to a still in such a manner that a portion of the gases generated surround the still, and the remainder is caused to pass through the still—suitable means being also provided for removing the coke residue from a passage independent of the gas-generator. Such a structure is shown in patent No. 4572 of 1913. He is further aware that it has been proposed in a similar apparatus to employ a jet of steam to assist in conveying the gas from the generator to the interior of the still—patent No. 6613 of 1915. In yet another apparatus it has been proposed to pass material to be treated continuously through a vertical retort by feeding it in at the top and removing it at the base—heat being supplied by circulating gas through the middle part of the charge from and to a gas-heater; while in another apparatus the material is kindled at the bottom of a chamber and the material fed in at the top—the residue being removed intermittently by a door at the base of the chamber. In vertical gas-retorts, too, heated by producer or like gas circulating around the exterior of the retort, the coked product has been delivered at the bottom beneath the surface of water on to an endless belt.

Gas Lighting Torch.—No. 108,142.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 7165; Dec. 30, 1916.

This invention relates more particularly to torches fitted with a valve operable manually (directly or indirectly) to permit the passage of a supplemental supply of gas for producing a flash at the burner.



Keiths' Gas Lighting Torch.

The illustration shows one form of torch tube fitted with a shield for the pilot flame, with the shield closed, a corresponding view with the shield open, and a section at right angles.

The apertured walls of coaxial tubes K L present a baffled passage serving to ventilate the pilot flame, which is supplied by gas passing directly by way of the port X into the tube B from a connection A in communication with a gas container—a port E, normally closed by a spring-pressed ball-valve C, offering a passage for a supplemental supply of gas when the valve is unseated. To unseat the valve, there is provided a plunger rod D slidable in a tubular guide and movable to displace the valve when abutted by a disc H when the disc is drawn downwardly by pulling a wire loop J connected with a slidable handle or trigger device (not shown) at the lower end of the torch tube.

Normally, the upper end of the burner is enclosed within a shield or covering member constituted by a longitudinally split tube F, of which the sections tend to separate at the upper end and are connected at the lower end to the disc H. When the pilot light only is burning—*i.e.*, in the position occupied by the respective parts when the valve C is seated—the rounded upper ends of the sections of the tube F enter a conical cavity in the cap M of the torch tube, being pressed into this position by the action of the spring G bearing on the underside of the disc H. When the disc is pulled down, however, the sections of the split tube are free to separate. The downward movement of the disc also effects the downward movement of the plunger rod D and the unseating of the valve C, whereby gas is permitted to pass through the port E, so that a flash is produced at the burner—a free outlet being afforded to the flame by the separation of the upper ends of the sections of the tube F.

On the release of the handle at the lower end of the torch tube, the spring G lifts the disc H, so as to allow the valve C to become seated, and cut off the flash—closing the split tube F.

Separating Low-Temperature Tars without Distillation.—No. 108,339.

MACLAURIN, R., of Stirling.

No. 10,263; July 21, 1916.

The patentee says he has found by experiment that true low-temperature tars—such as are obtained by distilling coals under patent No. 24,426 of 1913, "are quite different in their constitution and characteristics from ordinary coal tars, and that more valuable products can be obtained by the separation of such tars or crude oils without distillation than by distillation." The crude oils or tars to which the invention applies are "characterized by the almost entire absence of the aromatic hydrocarbons of the benzene series, so characteristic of ordinary coal tar, also by the absence of naphthalene and anthracene, and of large percentages of free carbon." Vertical retort tars, he defines as semi-low temperature tars. To such tars the process is not intended to apply.

The crude oils or tars to which the invention does apply consist apparently, it is said, of two main groups of products—viz., a resinous group, and a non-resinous group presumably consisting of paraffins, olefines, and naphthenes, with some cresylic acid and related bodies. The resinous group is at the moment of unknown constitution. The separation to which the invention relates is simply the first rough separation of this type of crude oil or tar into these two main groups of products. He claims: "The separation of true low-temperature tars into two portions, by agitating with a hydrocarbon oil (such as paraffin oil), in which the resinous portion of the tar is largely insoluble, and allowing time for the resins thrown out to settle down, whereby a resinous product, and an oil partly freed from resinous material, is obtained."

Separating Low-Temperature Tars into Components without Distillation.—No. 108,448.

MACLAURIN, R., of Stirling.

No. 8603 of 1917; July 21, 1916.

The object of this invention is to separate crude oils and tars—such as those obtained by working patent No. 24,426 of 1913—into portions, without resorting to distillation. This invention is only intended to apply to "true low-temperature tars"—that is, tars very deficient in aromatic hydrocarbons of the benzene series and which are also characterized by their freedom from naphthalene, anthracene, and free carbon. Crude oils obtained by the low-temperature distillation of bituminous or canneloid coals are equally amenable to the process; but to tars rich in aromatic hydrocarbons the process is not intended to apply.

To a measured volume of the crude oil obtained by carbonizing at a low temperature a bituminous or canneloid coal, the patentee proposes to add about an equal volume of water, made slightly acid by the addition of about 3 p.ct. of its volume of oil of vitriol. The temperature of the mixed liquids is raised to about 40° to 50° C. and the whole well agitated, and then allowed to settle. The resin settles to the bottom and can be run off. The acid layer can be treated direct for the recovery of bases, or if still distinctly acid can be used again on a further quantity of oil. The top layer of oil can be further freed from resins and phenolic bodies by treatment with caustic soda solution; and, after washing, a lubricating oil or grease is obtained. The resinous portion can be further washed with a light paraffin spirit; and, after separating and drawing off any water or spirit adhering, it is ready for use as a black varnish.

Low-Temperature Distillation of Coal.—No. 108,343.

LAMPLOUGH, F., of Waterloo Place, S.W., and OIL EXTRACTORS, LTD., of Victoria Street, S.W.

No. 10,726; July 28, 1916.

This process for the low-temperature distillation of coal consists "in bringing superheated steam or other gaseous heating medium, preferably at low pressure, into contact with the coal to effect the distillation."

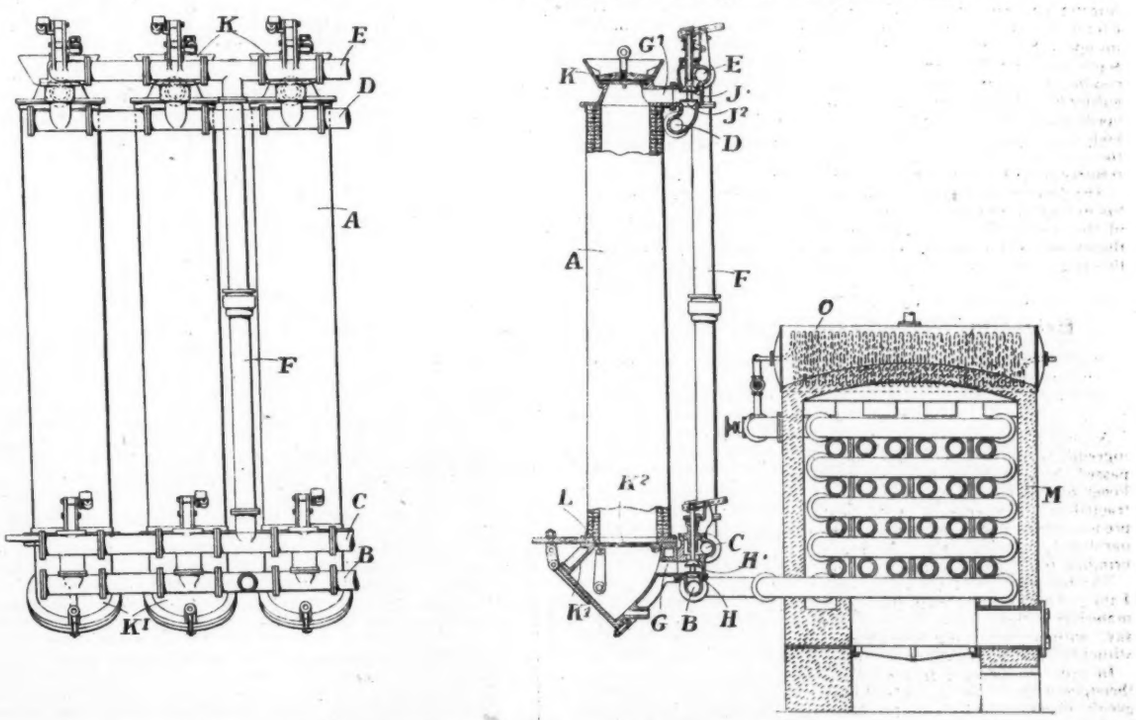
A front elevation is given of a battery of retorts arranged according to the invention, and a section showing, in addition, a vertical section through the type of superheater used.

The plant comprises a battery of vertical retorts A built with two parallel mains B C along the bottom, and another pair D E along the top. The main B is fed with superheated steam; whereas the main C, styled a "bye-pass feed," is connected by a down-take F with the top main E—the "bye-pass delivery." The main D is the gas-main. B and C discharge into a series of inlet ducts G—one for each retort. Communication between the mains and ducts is under the control of two opposed mushroom valves H H^1. Though not so shown, these are preferably arranged (like the valves J^1 J^2) co-axially with one another and with the stem of the valve H^1, made hollow so as to allow the stem of the lower valve H to pass through it. The two stems are provided with convenient control-levers, so that they may be moved in unison to close one or the other on to its seating and simultaneously to lift its fellow off its seating, or close both. The mains D E are similarly connected to an outlet duct G^1—a set of valves and an outlet duct being provided for each retort. The top of each retort is fitted with a hopper K, and at the bottom is a discharge mouth K^1, at the upper end of which is a perforated grate to support the coal. It is operated by a pivot arm L carried on a spindle and worked from a lever outside the discharge mouth.

The steam for the battery is provided by means of a superheater M, normally fed by exhaust steam from any steam-utilizing apparatus through a control valve. The top of the superheater is furnished with an evaporator in the form of a drum O built into the roof, so as to receive some of the waste heat from it. The drum (connected with a donkey-boiler or other source of live steam) contains a coil connected at one end to a water supply—for example, to a pump—and at the other end (by a valve) to the inlet of the superheater.

In use, the retorts are charged with coal, and steam is admitted at the bottom of the retorts—the degree of superheat ranging from about 200° C. to about 800° C. for the purpose of extracting the ammonia after distilling off the oil. The steam is of low pressure; but the coal is "distilled to the degree, and in the manner already known as the low-temperature distillation of coal."

Normally superheat is admitted from the main B through the valve H into the bottom of each retort, and the distillate escapes through the duct G^1, under control of the valve J, from each retort into the gas-main D. Normally the valves H^1 and J^1 are closed; and if the retorts are equally packed, all will be approximately equally heated. This, however, rarely is the case, and in result some retorts receive more steam than others, and in some the action tends to proceed relatively too rapidly and in others relatively too slowly. When, therefore, it is seen that the action in one retort is proceeding too slowly, one or more of the valves J^1 are opened slightly, and the corresponding valves J slightly closed. This diverts into the bye-pass delivery E some of the hot gas which otherwise would have been delivered into the gas-main D. At the same time, the valve H^1 on the retort where matters are proceeding too slowly is opened, and hot gas from the other retorts passes from the main E by way of the down-take F and the main C into this last retort to promote the distillation there.



Lamplough's (Oil Extractors, Ltd.) Low-Temperature Carbonization Plant.

MISCELLANEOUS NEWS.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Half-Yearly General Meeting was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. Chas. W. Braine) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

SHADOWS.

The CHAIRMAN said it became his duty to propose the adoption of the report and accounts. In doing this, in the fourth year of this gloomy war, the accounts reflected a good deal of shadow, but behind that some little sunshine. Among the shadows, they had to regret the death of the former Secretary and Manager of the Mitcham and Wimbledon Gas Company, Mr. Benjamin Green, who for 46 years faithfully served that Company. He was a man who was very much respected in the district of Mitcham, and one who did yeoman service to the Mitcham Company in helping to bring it to the fine condition in which they found it when it was amalgamated to the Wandsworth Company. The Company had now 583 men at the war; and from among them with others they had lost the nephew of Mr. Page, one of the Directors—a bright young fellow who was on the engineering staff.

A BIG INCREASE IN GAS SALES.

The report opened with one of the most reassuring features that could be given as to the progress of the business. In the half year, there was an increase of no less than 9·7 p.ct. in the sale of gas, compared with the corresponding half of 1916. In the first quarter of the half year, the increase was much greater. As long as the cold weather lasted, up to March, the increase as recorded in their books was 15 p.ct.; and it might have been more, if they had been provided with the means of dealing with such an accentuated demand, because it kept at full winter peakload (as he had said) right away up to March, owing to the cold weather. Neither the revisions of the purchases of material (though they adopted very expensive expedients) nor the condition of the plant, which had been heavily worked during the previous year, admitted of their dealing with the emergency with the freedom that ordinarily they would have expected to do. The first year or two of the war, the Government authorities, by cutting down the public lighting and the show lighting of shops, and then by means of the Summer Time Act, did much to modify the handsome increases that the Company had always enjoyed. Therefore, when in the third year they came plump on a demand for gas which was entirely unexampled in all their experience, it took them rather by surprise. The reason for this was that, during the three years of previous comparative stagnation, they had been meeting a great demand for cooking and heating stoves in the district. He foresaw, and foretold in one of his addresses to the proprietors, that this would mean at some time a great demand for gas for fuel purposes. Then they caught it with a vengeance; and he must say that some of their consumers were very forbearing and tolerant. The Directors and their officials could only be sorry for them, because the position could not be helped—the war having taken away the men who would otherwise have remedied their troubles. But this state of things revealed what the Directors considered was perhaps one of the happiest outlooks for the business, because in better times it would mean an enormous development due to the reliance of the ordinary population upon gas. The real secret of the additional demand was that they could not get coal. Probably when the old conditions were revived, their customers might be better off in that respect; but he was one of those who thought that they would still cling to such a handy means of cooking their food and heating their houses as was provided by merely turning a tap.

THE STATUTORY DIVIDENDS, AND A DIP INTO THE RESERVE FUND.

The revenue, in spite of this considerable increase in gas consumption, showed a profit of only £22,465, which meant that they had had to call upon the reserve fund to the extent of £10,862, besides mopping-up the small balance of cash they had in hand—£2403—in order to pay the proprietors the statutory dividends. These statutory dividends were not very shabby ones, as he thought the proprietors would agree. They were recommending on the "A" stock, a dividend at the rate of £7 5s. p.ct. per annum; on the "B" stock, £5 15s.; on the "C" stock, £5 1s. 6d.; on the Wimbledon stock, £5 2s. 6d.; on the Epsom stock, £5 15s.; and on the new ordinary stock, £5 1s. 6d. Although these were debased dividends, owing to the fact that they had during the war raised the price of gas by 9d. per 1000 c.ft. at various stages, a company which paid a minimum dividend of over 5 p.ct., even after it had been reduced by the operation of the sliding-scale (which reversed the dividend as the price went up), could hardly find a great deal of which to complain, although personally as a proprietor he could wish it the other way, and he could still more wish it the other way for the sake of their employees, who under the profit-sharing system only got 2½ p.ct., whereas they had 7 p.ct. before the war.

AN INSUFFICIENT INCREASE.

He told the proprietors at the last meeting that he could not possibly lead them to hope for so good a sheet as they then had before them; and he indicated that it would be necessary to raise the price of gas, which they accordingly did in the past half year to the tune of 6d. per 1000 c.ft., which to one like himself who had been practising in the gas business for 45 years seemed an enormous jump. But he was bound to tell the proprietors that the increase was not enough; even with the 6d., the price was too low. The price of gas in the Metropolis was now about 3s. 1d. per 1000 c.ft. Their price in Wandsworth, including the 6d. advance, was only 2s. 6d.; it was slightly more in Mitcham, and more still in Epsom. That, however, was not nearly enough. Coal alone accounted for an increased expenditure of £44,220; and, when he told the proprietors that the whole sum required for dividend and interest was only about £35,000, they would see that coal in a single jump had swept away more than the amount. As an alleviation, they had from residuals an increase of £17,826; but, on the other hand, they had an increase in oil (which was a most extravagant extra cost) of £12,342, which left them on materials alone with £38,736 to the bad. In addition to this, the war food bonus amounted to £10,777 extra for the half year; and he was bound to tell the proprietors that in the present half year this would be some £5000 more, because of the recent addition that had been made in it at the request of the men, to bring it up to the level of what the Government had allowed the railway men. If they took these various figures, and allowed for a saving which they unwillingly made on distribution of £6586, and the omission from the account of £1366, which they saved as a capital charge, or rather they did not save it, but they put it off for a time, and (though most accountants thought it should come from capital) meant to carry the amount to revenue in the future, they had a net addition to the expenditure side of the revenue account of £59,500. Against this they had £17,826 extra from residuals and £22,914 extra from the sale of gas, which gave them a net deficiency of £18,760. If they had had this sum to add to the £22,465 profit, it would be seen that it would have been quite unnecessary to draw from the reserve fund to give them the same balance for dividend.

THE RELATION OF INCREASED CAPITAL TO INCREASED GAS CONSUMPTION.

It was no use discussing a company's working unless they compared very jealously what additions were made to the capital account. It would be found in their case that they were modest enough—such as the new items of expenditure for distribution. They were perforce small, because of the scarcity and dearness of material, the difficulty of obtaining what they had got, and the high price of, and difficulty of finding, skilled labour to enable the fitting of meters, stoves, and the like. They would have been only too glad to have laid out more money in pipes throughout their district to deal with the unforeseen and sudden growth in the sale of gas. But this had been quite impossible. The total addition to capital, it would be seen, was £23,788, which meant 2·4 p.ct., whereas the sale of gas showed an addition of very nearly 10 p.ct. As long as they pursued this route, they were not likely to overlap the capital account. That day the capital stood at 7s. 6d. per 1000 c.ft., which was certainly the lowest of any company of which he knew in the South of England, possessing as they did a considerable fleet of steamers, barges, and road steam transport plant for conveying coals to the inner stations.

THE NEED FOR MORE CAPITAL.

He did not think there was anything to labour in that part of the accounts; but it brought him to the question of providing more money. They had overspent the capital account by £72,554. He wished to dwell on this because of their special meeting, at which he was going to ask for capital powers. The capital account had increased this year over this time last year by £45,000; and their stocks of coal and products by £43,325. They had had to raise money by loan from the bankers for the purpose of acquiring a large steamer, because they were met in the middle of last half year with a great shortage in the stock of coal due to the effect of the drastic limitations in the sailings of steamers, which had run them down from 100 p.ct. to only 60 p.ct. of their carrying power. It became immediately necessary to add this 40 p.ct. After some difficulty, they found a fine, handsome, new and well-built steamer, which cost them £96,500, which was between three and four times what it would have been built for in normal times. Even at this price, they found it paid by running at less than half what the outside price was now for hiring steamers—if they could get them. They could not always get them, when hiring even at the rate they paid on some of them—the high rate of 20s. per ton for the service which, he told the proprietors a year or more ago, they had carried on for less than 3s. by their own boats as they were able to run before the war. Then, again, the insurance on these steamers had gone up very much. It meant an amount in the future of something like £15,000 in a single half year. But it would be folly if, having bought these steamers (three of which at the market price to-day were worth quite three times as much as they cost the Company), if they did not insure them not only up to the cost price, but up to the price necessary to replace them if sunk. The Directors had to protect the Company's property in this way. They did not do this quite early enough; and in an accident they had, the assessor ruled that the Company should bear part of the loss, because the real market value of the steamer was nearly double what she stood at in their books. They had now insured quite up to the value of the boats. The £96,500 for the new s.s. "Lightfoot," they had put to a suspense account, because they wanted to see where they were in reference to the capital account, as controlled by the Income-Tax Commissioners. Ultimately it would go to capital. It stood now against the bank loan of £303,000. This consisted of the £96,500 for the steamer; war loan £38,000, which was a mere matter of exchange; and then some £170,000 the balance for general purposes. In this very account they had £124,000 in the single year of excess capital required for running the "show." Their bankers were very accommodating, obliging people; and they had helped the Company very much in the past, by being ready to lend money at a little below the rate they would have had to pay for new capital. Of course, the bankers did not care to lock up too much money in a trade over which they had no control; and so it would be necessary to replace in the bankers' hands a considerable portion of the money they had had from them. This was why the Directors had sent out a notice of a special meeting, at which he should submit certain resolutions for supplementing the capital.

The DEPUTY-CHAIRMAN (Mr. R. Garraway Rice) seconded the motion.

THE DEPRECIATED VALUE OF THE DEPRECIATED DIVIDEND.

Mr. J. E. ALLEN said he did not rise to criticize the Board of Directors. As a matter of fact, he himself was some fifteen to twenty years

ago a member of a board of a gas company; but, as their average age was then 68 years, the proprietors would not be surprised to learn that he was the sole survivor. But he was speaking on behalf of the shareholders in this and other companies. In his view, they had been exceedingly badly treated by the Government. He understood from a friend of his who was managing-director of the largest gas company in the world, that gas companies were doing a great deal of valuable work for the Government in supplying the raw materials for high explosives, and that they were not getting a fair market price for their bye-products. He understood that the Government department concerned came in and pocketed these things, and paid for them the price it thought fit. [The CHAIRMAN: Yes.] Unlike other people in business, when gas companies sold their chief commodity at a higher price, they got lower dividends. It would be a good idea to apply the same principle to other businesses, and then see what other people had to say about it. There was another point. The proprietors in this concern were getting a somewhat less nominal dividend than they had had in previous years—£5 1s. 6d. p.ct. on the Wandsworth "C" and the new ordinary stock. That was not the whole truth; it was not much more than half the truth, because £5 now would only buy about as much as 55s. or 60s. did three years ago. This was not due solely to the war, or to the scarcity of things. It was something beyond their control or the Company's control. It was due to the fact that they were living now on a depreciated currency. The Treasury notes were marked £1 and 10s. They were not really so. Behind this 160 odd million nominal worth of Treasury notes and certificates, there was only 28½ millions of gold. He was not going to say that the £1 was only worth 5s.; but, as a matter of fact, the number of notes in circulation had been going up almost weekly from the first moment they were issued. At the same time, prices had been going up. They were now paid their dividends in depreciated currency. Three years ago, they were getting nearly six sovereigns per cent. for their dividend; now they were only going to get five Treasury notes, with their low purchasing power. On the Stock Exchange, their shares had depreciated by about 25 p.ct. He gave 112 for his; and they were now worth about 85. If they had to realize their shares, they would get 85 Treasury notes for them, which were worth as much as fifty sovereigns were three years ago.

THE WAR LOAN—THE TIME FOR FINANCIAL REVISION.

Mr. W. ALLARD, J.P., said he always listened with considerable interest to the incisive remarks of their Chairman on the balance-sheet. He was sure he might say, on behalf of the proprietors, that they were extremely glad to see the Chairman there that day as keen and as dauntless as ever. Advancing years appeared to make no visible impression upon him; yet a bigger burden had fallen upon no man in the gas industry than upon their Chairman. He liked his speeches, because they were characterized by an optimism which he considered to be reasonable and sane—"reasonable and sane," because Mr. Jones did not put out of sight the difficulties and the dangers that still confronted those engaged in the gas industry. They were up against times when the war was not yet over. He observed that the Prime Minister always took a long view of the course of the war. The long view was the safer one to take. Therefore, there were still considerable troubles ahead of the industry. If he was critical over one point, he hoped the Chairman would bear with him. The Directors, he saw, made an investment of £38,000 in 5 p.ct. War Loan. He would ask the proprietors to forgive him mentioning that he happened to have been closely and financially associated with the National War Savings Committee for over a twelvemonth, to assist the Chancellor of the Exchequer in floating the War Loan. He recollected very well the line that the Chancellor's appeals took both to private individuals and to companies and corporations. He asked for savings and balances of profits, and anticipated savings and profits. He (Mr. Allard) scarcely thought that anyone who had overdrawn at the bank on Dec. 31, 1916, to the extent of £140,000, and on June 30 last to the extent of £303,000, could be said to be in the way of having any anticipated balances or profits in the immediate future. The investment from the patriotic point of view was most praiseworthy. That he supposed could be its defence. But the last War Loan was not the only War Loan that would have to be subscribed; and it was just as well to understand there would be a War Loan in the immediate future; and probably another subsequently. The Chairman might say to him, and it would be justifiable, that in 25 years' time the £38,000 would be paid back, and the only loss would be the difference between the amount of interest received less income-tax, and the amount the Company had arranged with their bankers. It might also be said that gas companies of lesser degree and even greater companies had subscribed to the War Loan. The South Metropolitan Gas Company had subscribed as much as £237,500, although the last balance-sheet showed temporary loans to the extent of £815,000, besides the £237,500 for War Loan. But there it was. Why he drew particular attention to this point was that subscribing to the War Loan was a distinct service rendered by the Company to the Treasury. But did the Company get any easement of their affairs from the Treasury or the Government? He read the other day (July 24) a leading article commencing with these words:

> **How many men in the gas industry have ever stopped, in the rush and pressure of current circumstances, to inquire whether they know of any other industry that is so oppressively financially conditioned and handicapped in these times as the one to which they themselves belong. They would have difficulty in finding another.**

These were sentences taken not from a sensational newspaper, but from the leading newspaper in the gas industry. They were sober truth. To his mind, these words in such a newspaper increased the difficulties of gas directors in raising fresh capital. Companies could not invite investments so long as there was no answer to the question "whether there was any other industry that is so oppressively financially conditioned and handicapped in these times as the gas industry;" for the inevitable tendency and influence of a sentence of that kind in such a paper was to further depress the existing prices of gas shares. He should have liked to have heard from the Chairman—this was one of the few omissions from his speech—that there was to be a resolute attempt to press on the Board of Trade, and indeed to insist upon, so far as practicable, some alleviation to the gas industry. He need not go further into these conditions. They were fully set out—and admirably set oue—in the article in the "GAS JOURNAL;" but he would quote a few sentences:

> **The raw material of the industry is coal; and the coal industry is allowed to charge 4s. per ton extra (the Welsh part 6s. 6d.) in order to cover war expenses. The gas industry has to pay this additional charge per ton—running, without the extra paid to the Welsh and Forest of Dean collieries, to some £3,600,000 a year upon 1913-14 costs. It has to pay more for all the materials, the goods, and the labour it requires, including those that are essential to the making of the products needed by the Ministry of Munitions and the fertilizer necessary to the intensifying of the production of food. While the industry has to pay these higher wartime costs, with no allowance made for them, as in the case of the coal and sulphuric acid industries (so preserving their return upon capital), it has been decreed that it must be content with lean prices in present circumstances for the products required for munitions and for food production. The prices the farmer is to be paid for his cereals are controlled, but at figures that give a very good margin for his increased expenses; and it is the gas industry that has to supply him at a (having regard to costs from coal to acid, lime, wages, &c.) low price with the fertilizer that enables him to largely increase the produce from a given area of land, and the profits from that enlarged produce on the high-scale price allowed.**

He saw that the Chairman of the South Metropolitan Company (Mr. Charles Carpenter, D.Sc.) did not think that, in the midst of war, was the time to ask for a revision of the sliding-scale. He thought Mr. Carpenter underrated the capacity of the Government. In his (Mr. Allard's) opinion, the time had arrived when the gas companies—in fact, the whole of the gas industry—could bring its influence to bear upon the Board of Trade, in order to obtain some alteration of its conditions, one of which was the sliding-scale, which had taken a considerable jump backward. As to the question of leaving the discussion to the end of the war. First of all, they had no knowledge as to when the war would be over. And whenever the war was over, there would be a congestion of questions to be settled, and whoever waited until that time would get a slight hearing. They heard talk of some 100 million pounds being spent on rehousing after the war; they knew that education would come up for greater expenditure; they knew there must be a settlement with all the railways. Problems of this kind, and other war problems, would come to the front. Therefore, he did press upon the Chairman the urgent necessity of approaching the Board of Trade in this matter, and urging it upon them with all the influence of the gas industry.

The CHAIRMAN asked what direction Mr. Allard thought the movement should take. There was a lot of criticism; and it would help him personally in connection with the National Gas Council if Mr. Allard would indicate the particular shape he would like this to take. They must put some tangible proposition forward. One of the characteristics—he would not call it a merit—of the sliding-scale was that it linked-up the consumers of gas with the shareholders in a mutual bargain. They might complain as shareholders, but the consumer had the right to complain too. He could agree fully and firmly with what Mr. Allard said in his opening remarks. The Treasury first of all stopped the Company from raising capital, and then grudgingly admitted the issue of a small quantity, while the War Department exacted from them services which demanded plant and capital; services from their staff, and the products of the plant, which they took at their own price. Lord Moulton had freely and candidly stated that the gas industry had enabled the Explosives Department to put the forces of the country in a position to maintain the war. Their contribution to the War Loan was a small thing compared with that; for the War Loan simply meant that the bank lent them the money and took the interest. But as to the other sacrifices that had been made, could they have done more? They received no reward. And when a member of the National Gas Council went to the Board of Trade about this matter, he was told that, inasmuch as the sliding-scale was a bargain, they would have to examine into every case by itself, because each presented its own individual conditions. The sliding-scale now existed almost universally; but the maximum or fixed-price companies were in a worse condition; for when they exceeded their fixed price, they must go on selling at a loss. There was no margin that could be put on the consumers in their case, as there was in that of the sliding-scale companies. The only thing he could see that they could ask the Government to do would be to take the companies' dividends upon their shoulders, and let the companies carry out their behests and requisitions with the knowledge that the shareholders would then be saved their dividends. The Government, however, were not likely to do that. If they did, it would mean introducing control into the industry, which might be considered undesirable and irksome. Whatever they did in this chaos—this enormous conflict that was going on in Europe—they could not make the conditions last more than to the termination of the war, and then be replaced again. One thing which a company having taken the sliding-scale with the standard price fixed always contended for was that, the capital having been subscribed on the faith of the standard price, on no account should it be reduced. Regarding the processes that had been developed for the service of the nation, the plant and processes would abide with the gas industry after the war; and, with his everlasting optimism, he was going to look upon the future working of these plants, after the Government had ceased to take their products, as being perhaps one of the most encouraging aspects of the gas industry. Reverting to the question of the sliding-scale, he was constantly at meetings where the leaders of the gas industry were gathered together; and he declared he was absolutely bewildered by the multitude of the counsel that was given on the matter; and he was certainly puzzled to know in what way the Board of Trade in its present congested state could take up the work of reviewing the question in every gas company of the kingdom. It was hopeless, even if Parliament would sanction it; and he thought that what Parliament would say was: "You must put up with your loss as well as the rest."

PENSION SCHEME SUGGESTED.

Mr. HARWOOD suggested the formation of a pension scheme in connection with the Company. He attended the meeting of a progressively and excellently managed gas company the previous week,

at which it was decided to establish a contributory pensions scheme in connection with the co-partnership scheme; and it seemed to him to be a happy idea.

The CHAIRMAN remarked that the best possible use to which accumulations under the co-partnership scheme could be put would be the provision for old age; and when the system was introduced into the Commercial Gas Company, it was regarded as one means of providing for old age and misfortune. He thought what Mr. Harwood suggested was worth consideration; and, in happier times, he hoped they would introduce some such system as that indicated.

The motion was unanimously carried.

DIVIDENDS.

Proposed by the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the dividends mentioned in the opening address were unanimously passed.

INCREASE OF SECRETARY'S SALARY.

On the proposition of the CHAIRMAN, seconded by Mr. ALLARD, the salary of the Secretary was advanced by £100 a year. It was pointed out by the Chairman how with the shortage of staff, the increased burdens of war time, and the extra work connected with the shipping, the duties of Mr. Braine had considerably increased.

Mr. BRAINE, in his acknowledgment, mentioned that he had passed his majority as Secretary of the Company and the old Wandsworth and Putney Company.

Special Meeting—Stock and Borrowing Powers Authorized.

A special meeting was then held "to authorize the creation and issue of new ordinary stock, and to exercise the borrowing powers of the Company in such manner as the meeting may approve."

The CHAIRMAN said he had explained to the proprietors that they were not going to spend the money, but required it to pay off the bank, so that they were already paying interest upon it. Out of it perhaps they would be able to afford to increase the distribution system, for the plant was in good order, except for some additional retorts at the works, which would increase Mitcham by 50 p.ct. However, whatever was provided in this way would be met by increased sales. The Directors thought it better that the bonds to be issued should be terminable; so that the high rate of interest paid during the war would be got rid of after the war by paying them off. The first resolution referred to the unexercised borrowing powers of the Company [see resolutions below]; and in place of debenture bonds, they proposed to issue repayable mortgages. The second resolution referred to the unexercised borrowing powers. There was a balance of borrowing powers in connection with the £150,000 ordinary stock which the proprietors had already authorized the Directors to issue. This carried £50,000 debentures, of which nearly £17,000 was raised, leaving £33,316. But they did not want the power to raise by permanent debenture loan but by terminable mortgages. No. 3 resolution went the "whole hog," and asked for authority to raise from time to time £150,000 of new ordinary stock, which was the balance. They were not likely to raise it during the war, because it was not terminable. They would have to go to Parliament to make it so; and some of it might have to be cancelled as against a repayable loan. There were the borrowing powers in connection with this £150,000; and the £50,000 in this connection (this was the fourth resolution) was not likely to be called in question or be exercised in future for perhaps the next twenty years. Therefore the passing of the resolution was a formality to place the Directors in a strong financial position, so that the bank would be safeguarded. The first resolution was:

> That the Directors be, and are hereby, authorized to borrow on mortgage of the undertaking from time to time sums amounting in the whole to £34,050 in exercise of the borrowing powers of the Company which at the present time are exercised by the issue of debenture bonds for the like amount, when and so far as such bonds shall be hereafter paid off, such mortgages to be issued on such terms and conditions, and to be repayable at such dates as the Directors think fit, and when fully issued to be in lieu of debenture stock to the amount of £34,050 being the balance remaining unissued of the £60,000 debenture stock, bearing interest at 4 p.ct., which the Directors were authorized to create and issue by the resolution of the proprietors passed on the 4th day of March, 1913.

The DEPUTY-CHAIRMAN seconded the motion; and it was carried.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the second resolution was passed as follows:

> That the Directors be, and are hereby, authorized to borrow on mortgage of the undertaking from time to time, in respect of the unexercised borrowing powers of the Company in regard to the £150,000 ordinary stock which the Directors were authorized to create and issue by the resolution of the proprietors passed on the 4th day of March, 1913, sums amounting in the whole to £33,316 11s. 5d.; such mortgages to be issued on such terms and conditions, and to be repayable at such dates as the Directors think fit, and to be in lieu of debenture stock to a like amount, bearing interest at 4 p.ct. per annum, being part of the debenture stock which the Directors were authorized to create and issue in respect of the unallocated capital by resolution passed on the said 4th day of March, 1913.

On the motion of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the third resolution was passed:

> That the Directors be, and are hereby, authorized to raise from time to time the sum of one hundred and fifty thousand pounds (£150,000) further part of the "unallocated capital authorized by the Wandsworth, Wimbledon, and Epsom District Gas Act, 1912, by the creation and issue of new ordinary stock not exceeding in amount, with premium (if any), the before-mentioned sum, in accordance with the provisions of the said Act, and under such terms and conditions as they may think fit.

Moved by the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, the fourth resolution was passed, as follows:

> That the Directors be, and are hereby authorized, to borrow on mortgage of the undertaking from time to time in respect of the £150,000 new ordinary stock authorized to be created and issued by resolution passed this day sums amounting in the whole to £50,000, such mortgages to be issued on such terms and conditions, and to be repayable at such dates, as the Directors think fit.

On the motion of Mr. ALLARD, seconded by Mr. J. G. GLOVER, a hearty vote of thanks was passed to the Chairman and Directors, and the officers and employees generally.

HORNSEY GAS COMPANY.

Price of Gas Reduced.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. W. E. Roberts) read the notice convening the meeting; and the report and accounts were taken as read.

THE CHAIRMAN'S STATEMENT.

The CHAIRMAN said he thought the Directors might fairly congratulate the proprietors on this occasion upon the excellence of the accounts which they were privileged to present to them. The small attendance was the most direct and complete compliment that the Directors could receive in this matter. It would be noticed, in the first place, that there had been a gratifying increase in the business—to be exact, one of 6·69 p.ct.—and although there was nothing very abnormal or sensational in the different items of account, they would amply repay scrutiny and consideration by the proprietors. These were anxious times; and mere results, without a study of the causes producing them, would hardly satisfy a careful investor. But however closely they might look into the accounts, he felt perfectly certain nothing would be found in them which would not tend to reassure them from an investment point of view, and to inspire them with encouragement as to the future of the undertaking. Now, the value of the position was a comparative one, because they knew quite well that in the case of the more important gas undertakings there had been a very serious depreciation of their prosperity, and such a change as to render the outlook very precarious; and the larger the undertaking, the more markedly was this becoming the case.

THE ACCOUNTS.

Going through the accounts rapidly, and endeavouring to select the salient items, he would first point out that they had now about £155,000 of capital which could be issued to meet the development of the Company. This was a satisfactory feature. However favourable the past three years might have been for applications to Parliament, he did not think this favourable atmosphere continued; and the undertaking was fortunate which had made provision for its capital requirements at the present time without contemplating further application to Parliament. It would be seen that the total capital received amounted to £276,563; but in calculating the capital employed, for the purposes of administration, this must be reduced by the sum of £25,000, which was a purely nominal addition under the powers of the last Act, for money transferred to capital from the carry-forward, upon which no interest or dividend was chargeable. Making this deduction, it transpired that the amount of capital per million c.ft. of gas sold per annum employed by the Company stood at the exceptionally low figure of £427 This was a factor of such importance as to govern the figures that followed it as they passed on through the accounts. On capital account there had been expended during the past six months £3027; and this was depreciated by the amount of £849 which had been written-off meters. Considering that they were just completing a very important reconstruction and re-arrangement of works, this was not a large amount to have spent; and it was quite inconsiderable when taken in connection with the increase in the business, to which he had already referred, of over 18 million c.ft. in the six months. Turning to the revenue account, of course, the comparative changes were important. Coal, oil, and coke had cost them £6712, or nearly 28 p.ct., more. The main rise had been in connection with oil, which had increased by some 200 p.ct. The rise in the actual cost of coal only amounted to 2s. 8d. per ton as compared with last year. He might, however, point out that, as compared with pre-war conditions, roughly speaking all the Northern Suburban undertakings were upon one common footing. The cost of coal had in each case been increased, in round figures, by 50 p.ct. The different items charged by way of repair and maintenance were important as qualifying any profit subsequently arrived at; and he might tell them that in these accounts they had been kept up to a proper figure, and that nothing had been gained in the accounts by any improper reduction of these items. The only other matters on the debit side of the revenue account to which he need call attention were the two final ones—allowances to dependants of employees on active service, and appropriation to benefit fund. These had increased by £1010. But he was perfectly certain that the proprietors would be reconciled to this increase, as it represented an eminently proper principle in the treatment of a matter which commanded the sympathy of everyone. On the credit side of the account, gas and rental of meters and fittings had brought in £5325 more, and residuals £2804 more. The total increase in receipts had amounted to £8169. On the other hand, the expenditure was £5590 in excess of the comparison period; and so the profit was £2570 greater. It was only fair to say that in the period with which present results compared there was a small deficit of £250.

GOOD NEWS FOR CONSUMERS.

There were a few ancillary statistics which would no doubt interest the proprietors. They had sold 12,553 c.ft. of gas per ton; and as for the major portion of the time no oil had been used, this represented a very moderate reduction upon the amount made per ton when the oil was available. Oil cost to-day practically 1s. per gallon, as against something like 2½d. before the war. The Company had a reasonable quantity in stock by way of provision for the requirements of the winter. So far as they could see, in fact, the Directors did not anticipate that they would have to make further purchases in so very un-

favourable a market—certainly not in the immediate future. The unaccounted-for gas was under 5 p.ct. The other fact which must be borne in mind in connection with the revenue account was that the Company's total increase in price since the war began was 4d. per 1000 c.ft. As would be seen from the report, the dividends were maintained at a substantial figure; the loss which the proprietors had incurred during the whole of the past troubled three years having been confined to ⅛ p.ct. of their dividend. He would content himself with saying now that it was the immediate object of the Board—and they had a reasonable confidence in connection with the matter—to restore to the proprietors this ⅛ p.ct. He trusted they would be able to do so. The selling price of gas shown in these accounts was 3s. 1d. per 1000 c.ft.; and at this price they were selling gas—in a district in the North of London, divorced from the advantages of water-carriage—at the same figure as the South Metropolitan and the South Suburban Companies. That day, however, the Board had decided to reduce the price, in common fairness to the proprietors; and this would mean that, with one single exception, the Hornsey Company would be selling the cheapest gas in the whole Metropolitan area—be its competitors big or small. He thought they would agree that this was no mean achievement, in the face of the difficulties of which the proprietors were cognisant, and which the Directors had more keenly to recognize in their administration of the Company's affairs. To get to the summary of the matter, they brought £11,799 into the net revenue account; and this was supplemented by £10,338 the profit for the half year, and £121 for interest. For income-tax and interest on deposits and debenture stock, a sum of £3469 was needed; and £1000 was transferred to the special purposes fund account. This left them with a balance of £17,790. When they had paid the dividend, which would require £5057, there would remain to be carried forward £12,733, or £934 in excess of the amount brought into the account. He did not think there was anything else to which to call attention until the balance-sheet was reached; and there it would be observed that they had, under the different items enumerated, cash in hand to the amount of £18,264. It would also be seen that the amounts standing to the credit of the special purposes fund and the reserve fund were invested, and so were available. Some undertakings had handsome figures to the credit of these funds, but the amounts were not invested; and when money was not invested in these days, one could very easily guess what had happened to it. This was the position as it stood to-day. He would, however, like to emphasize the fact that, of all the Companies in the Metropolis, with one single exception—and he did not know how long this would preserve its distinction—the Hornsey Company had succeeded in selling gas in these troublous times at the lowest price. He concluded by moving the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. A. F. Phillips) seconded the motion, which was at once carried unanimously.

THE DIVIDENDS.

The CHAIRMAN then moved: "That the sum of £1645 16s., less income-tax, for the payment of the half-year's interest on £65,832 5 p.ct. preference stock to June 30, 1917, be set apart, and that the same be paid accordingly; and that a dividend at the rate of 12 p.ct. per annum on the 10 p.ct. "A" stock, and at the rate of 9 p.ct. per annum on the 7 p.ct. consolidated stock, for the half year to June 30, 1917, subject to income-tax, be, and is hereby, declared payable."

Mr. J. M. MILES seconded this, and it was agreed to.

VOTES OF THANKS.

The CHAIRMAN proposed a hearty vote of thanks to the Engineer and General Manager (Mr. J. W. Buckley), the Secretary, and the other officers and the staff. He remarked that it had been his privilege that day to present a very favourable set of accounts to the proprietors; but it was no more than justice to say that, whatever excellence attached to these accounts—and very much did so attach—was primarily due to the splendid work that had been done by Mr. Buckley. There was no officer more vigilant; and he could not call to mind one who in a greater degree possessed that most valuable quality of foresight and prescience in anticipating difficulties before the precise moment at which he was confronted with them. It was largely due to this fact that the undertaking stood as well as it did that day. Of course, an engineer had not only to deal with the ordinary difficulties which his training and experience would lead him to expect, but he had to tackle problems which were only very faintly indicated in advance, though they might be vital to the operations he conducted. In every item he had mentioned to them, there was evidence of the work of their Engineer and General Manager in the past, and of his effective skill in the administration of the works in the present. The proprietors owed him a very hearty vote of thanks. With regard to the other members of the staff, no one was spared at a time like this. The Secretary had served them loyally and well; and the same might be said of the whole staff.

Mr. G. W. CAREY, in seconding the proposition (which was cordially agreed to), said he thoroughly endorsed all that had fallen from the Chairman.

Mr. BUCKLEY, responding, remarked that the half year had been a most strenuous one. Everyone connected with the Company was proud of the fact that they were able to sell gas at so low a figure.

Mr. F. G. PILLEY, moving a vote of thanks to the Chairman and Directors, pointed out that there was evidence in what they had heard, and in the report, to show that each member of the Board had rendered good service.

Mr. JOSEPH CASH seconded the vote, which was unanimously accorded, and acknowledged by the CHAIRMAN.

According to a report of the American Minister at Stockholm, a recently issued Royal Decree prohibits the consumption in Sweden of electricity and gas for signs or for advertisements out of doors. The same Decree also limits the use of gas and electricity in private houses and commercial buildings. In Stockholm there may be consumed only 60 p.ct. of the quantity used during the corresponding period of last year. This amount is furnished at the usual rate. An additional 30 p.ct. may be taken, if necessary, at greatly increased charges.

BARNET DISTRICT GAS AND WATER COMPANY.

Business Shows a Satisfactory Development.

The Half-Yearly Meeting of the Company was held last Wednesday, at the Offices, No. 139, Cannon Street, E.C.—Mr. A. F. PHILLIPS, M.Inst.C.E. (the Chairman), presiding.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said the past half year had been a continuance of the anxiety of the half year which immediately preceded it. There had been the attention necessary to maintain the stock of coal and other material for ensuring the continuance of the supply of gas and water to the Company's district. There had also been trouble in replacing the 83 men out of 160 of the Company's employees called upon for military service. The result of the half year's working under such conditions might be considered satisfactory. While there had been no important extensions of the works and mains, the business of the Company showed a satisfactory development. The sale of gas increased over 14 p.ct. on the corresponding previous half year, and the water-rental over 2½ p.ct. There had been no new building in the district; and only 32 new gas and 15 water services were laid. The small increase in the water-rental was owing to there being no new building supplies. From the statement of the capital account, it would be seen that there was again no addition to the capital expenditure, which was satisfactory in these times, when capital was difficult to obtain. In the revenue account, coal had cost £9696, against £8409 the previous half year, due to the increased cost and 582 more tons having been carbonized. Oil and coke figured at £698, against £252. Some 4½ million c.ft. more of carburetted water gas had been made; and the cost of oil was higher. Repairs of works showed an increase from £2506 in 1916 to £3298 for the past half year, due to expenditure on the carbonizing plant. The expenditure on meters was £540, against £372; but on stoves there was a reduction from £1343 to £1138, less work having been done. The war-bonus and allowance to employees had risen from £342 to £679; and this item would continue to increase. The other expenses were much the same as the previous half year. The revenue from gas was £18,644, against £16,565, due to an additional 14 million c.ft. having been sold; the price of the gas having been the same. Products returned £5258, against £4698; the increase being obtained from the higher price realized for coke, as sulphate of ammonia showed a falling off of £221. The result of the half-year's working was a profit of £4033, as compared with £4425 in the previous year. The expenditure on pumping charges in the water revenue account was £3069, against £2705, due to the increased cost of fuel; all other charges remaining much the same, except that, as with the gas undertaking, the war bonus and allowances to dependants of employees on military service had gone up from £342 to £679, and would further greatly increase. The water-rental showed only a slight increase; being £25,067, as compared with £24,396 the previous year, though 51 million gallons more water were supplied. The increased consumption of water might be due to waste during the long frost, and more water being used in the warm weather of May and June. The net profit from the water undertaking was £14,454, against £14,655 for the previous half year. The profit and loss account showed that, after adding the balance from the gas and water accounts to the £23,203 brought forward, and deducting £4354 income-tax, £1529 interest on debentures and temporary loans, and transferring £1000 to the contingency fund, there remained an available balance of £34,992, from which dividends of 9, 8, and £6 6s. p.ct. were recommended, absorbing £11,125, and leaving £23,866 to be carried forward. The works had been provided with a plant for the recovery of the benzol from the gas, and a hot-coke conveyor, which had been charged against the contingency account, the balance of which would stand at £15,119.

THE PRICE OF GAS.

Throughout the half year the staff and the employees had loyally served the Company's interests. The dependants of those serving with the military forces had been properly cared for. The Directors also, realizing the additional cost of living, granted increases in the war bonuses which they considered would meet it. These increases did not, however, satisfy the demands of the Company's employees; and further advances had had to be conceded, with which they should be content. The rises in wages were so serious that it would most probably be necessary to make a further increase in the price of gas to meet them. He might remind the proprietors that there had only been an advance of 2d. per 1000 c.ft. since the war broke out; and the Directors had hoped to avoid any further increase. He had recently visited the gas-works and all the pumping-stations. They were in excellent order, and equal to meeting any demands likely to be made upon them. The results obtained had been most satisfactory—over 13,000 c.ft. of gas and 10½ cwt. of coke per ton of coal having been sold. The fuel used in pumping the water was only 3¼ tons per million gallons, with a lift varying from 380 to 557 feet head. If in the past the undertaking had been able to maintain its position, the future was full of the greatest anxiety. Labour became ever more difficult, as the needs of the country made demands for more men; and the additional wages paid would have a serious effect on the Company's results. They were employing many women, and excellently they did their work; but there was some work for which they were not suitable. The supply of coal and oil was always a source of anxiety. The Government were ever making increasing demands for benzol and tar, which were vital for the conduct of the war. It was possible that, in order to increase the production, changes might have to be made in the system of carbonizing, the effect of which on the Company's results might not be advantageous; but whatever was necessary to meet the country's requirements, the Company would, so far as they were able, loyally carry out. The benzol-producing plant was working satisfactorily. To enable the Company to carry on this process, an Order under the Calorific Standard Act, to replace the illuminating power standard with a calorific standard, had

been made by the Board of Trade. This gave no benefit to the Company, as works of their size could not make it remunerative. It was adopted from patriotic motives.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) seconded the motion, which was unanimously agreed to without discussion.

On the proposition of the CHAIRMAN, seconded by Mr. ALFRED LASS, F.C.A., dividends were declared, less income-tax, for the half year, at the rates per annum of 9 p.ct. on the "A" and "C" stocks, 8 p.ct. on the "B" stock, and £6 6s. p.ct. on the "D" gas and water stocks.

The CHAIRMAN proposed a hearty vote of thanks to the Secretary (Mr. Drew), the Engineer and Manager (Mr. F. J. Bancroft, M.Inst.C.E.), the members of the staff, and all the Company's employees for the services they had rendered during the past half year. He said they had all been most devoted to the Company's interests, and had endeavoured to obtain the best possible results. Mr. Bancroft especially had had a very anxious time in keeping the works going and getting in the necessary material, as well as in endeavouring to make his men feel satisfied.

Mr. DREW and Mr. BANCROFT suitably returned thanks for the vote, which was cordially passed.

Proposed by Mr. F. R. SMITH, and seconded by Mr. WILLIAM RICHARDS, a hearty vote of thanks was accorded to the Chairman and Directors, and this brought the meeting to a close.

INCREASED PRICES AT NOTTINGHAM.

Nottingham was among the last of the large municipal gas-owning authorities to raise its charges; but when a general increase of 12½ p.ct. was made in June, 1915, it was accompanied by the intimation that the trend of events might render a further advance inevitable. In January of this year, there was a limited increase in regard to a class of special customers using gas for power and gassing purposes; but there has been no general addition to the prices since the middle of 1915.

With profits still maintained at a high level, the Committee have been able to withstand further demands upon the bulk of the consumers; but a report presented at a meeting of the Council held yesterday indicated the impossibility of longer delaying a revision of the scale. It was recommended that there should be an advance at the rate of 6d. per 1000 c.ft., to come into operation at the end of the current quarter. The Committee pointed out that, since the advance of 12½ p.ct. was made two years ago, there has been a continuous and steady increase in the cost of coal and all materials connected with gas manufacture, in addition to a considerable rise in wages. The cost having now become so serious, they recommended the Council to authorize an increase in the price charged for all purposes, other than for power and gassing (except for gas supplied through prepayment meters, with respect to which no alteration was for the present suggested). The 12½ p.ct. mentioned will merge in the new increase; and in future 2s. 10d. per 1000 c.ft. will be charged if the consumption be under a million c.ft. per quarter, 2s. 9d. if the consumption is a million and under 4 million c.ft. per quarter, and 2s. 8d. when the consumption is 4 million c.ft. and upwards per quarter. The charge for gas supplied through prepayment meters remains at 3s. 4d. per 1000 c.ft.; and the new scale does not apply to the districts in which special charges for gas are made under statutory powers.

The discussion on the motion for the adoption of the report was adjourned.

LICHFIELD PUBLIC LIGHTING CONTRACT.

The Question of Maintenance.

At a meeting of the Lichfield City Council, the Streets and Highways Committee, to whom a recommendation that the Council should continue to pay the Gas Company's maintenance charge of £218 per annum less 5 p.ct. discount, had been referred back, reported that, after full consideration, they unanimously agreed to adhere to their recommendation. The Gas Company stated in a letter that the charge was made up as follows: One year's interest on the capital value of the lighting plant, £77; maintenance, depreciation, rates, taxes, and painting for twelve months, £141.

Mr. WINTERTON expressed his surprise at this decision, and said he had a large and influential body of ratepayers behind him. He dare not support the recommendation, as he was convinced they would be surcharged by the Local Government Board. The restriction of lighting was under the Defence of the Realm Regulations; and if the Gas Company considered they had a claim for interest and maintenance, it was against the Defence of the Realm Losses Commission. In his opinion, the Corporation were not responsible for any further charge than the cost of the gas to light lamps which were lighted, *plus* the cost of the maintenance of the standards. This he placed at not more than 3s. each on an average per annum. He opposed the recommendation, not only on commercial grounds, but from the standpoint of the Corporation's duty to the ratepayers. There was no member of the Council who would enter into a contract of this kind if he had to pay the money out of his own pocket; and the Corporation ought not to spend public money where they would not spend their own.

The SHERIFF (Mr. J. R. Deacon) moved an amendment that no contract be entered into with the Gas Company.

Six voting in favour and six against, the Mayor gave his casting-vote in favour of the Committee's recommendation.

Mr. W. MORRISON said the Gas Company had invested their capital, and were perfectly entitled to interest on it. If the Council did not renew the agreement, they would have to pay increased charges on the next contract, or the general consumers would have to pay. The Company would not be the losers in the long run.

The DEPUTY-MAYOR (Mr. C. T. Wigham) said it was only right that the Council should pay for the maintenance of the plant, so that it was ready for immediate use; and he strongly supported the Committee's recommendation. The charge was the same as had always been paid.

Eventually an amendment that the question be again referred back to the Committee was carried by seven votes to five.

COAL GAS FOR MOTOR VEHICLES.

Some Glasgow Experiments.

A report on some experiments which he has been carrying out in connection with the use of coal gas for motor vehicles has been presented by Mr. Richard Liggett, to the Glasgow Corporation Gas Committee. The lines followed were those indicated in a paper on the subject which Mr. Liggett read last year before the Foremen's Association of the Glasgow Corporation Gas Department [given in the "JOURNAL" for Sept. 26, 1916, p. 620.]

A special gas-controller and a governor or reducing valve invented by him were used for the experiments; and nine cylinders tested up to 250 lbs. per sq. in. were loaned by the North British Railway Company. One cylinder was fitted on each side of the chassis, and one at the rear; giving a total holding capacity of 400 c.ft. of gas at 200 lbs. pressure. The remaining six cylinders were coupled together in the yard, for the purpose of forming a quick-charging battery, containing 1785 c.ft. of gas at 250 lbs. pressure. The force-pump used compresses 400 c.ft. of gas in 80 minutes; whereas the battery cylinders will supply the same quantity in four minutes. For the trial runs, a 25 H.P. Halley 2-toner was selected, the unladened weight of which is 3 tons 11 cwt., including 5½ cwt., the weight of the three cylinders and fittings; and the tests were carried out with a measured gallon of petrol as against 400 c.ft. of gas. The results are given in the table, as well as those of enriching the gas with petrol by the two following methods, neither of which showed good results:

1.—By blowing the gas at low pressure on to a gallon of petrol in the low-pressure tank (ordinary petrol tank), which is used to allow the gas to expand before being taken up by the engine. By this method, 19 gills of petrol are absorbed.

2.—By the gas blowing through the trap in which a measured gallon of petrol has been placed. By this method, 6 gills of petrol are absorbed. The trap mentioned is a 5-ft. length of 4 in. steam-pipe, which is placed between the pumps and the gas-cylinders of the car to trap any oil or water which may come from the pumps.

FLEXIBLE GASHOLDERS.

A comparison was secured between gas contained in a flexible holder and that in a steel holder. The test was made with a load of 2 tons of lead. The Gas Department motor was a 25 H.P. Halley, gross weight 5 tons 11 cwt., including the steel holders, containing 400 c.ft. of gas at a pressure of 200 lbs. per sq. in. The consumption of gas for the 7-mile run was 235 c.ft., or 33·57 c.ft. per mile. The time taken was 40 minutes. The other motor was a 30 H.P. Halley, gross weight 5 tons, including the flexible holder containing 330 c.ft. of gas. The motor consumed all the gas in covering 6·3 miles; the consumption being 52·38 c.ft. per mile. The time taken was 36 minutes. This test showed 18·81 c.ft. per mile in favour of compressed gas. Mr. Liggett remarks that, as a war-time or emergency expedient, the flexible holder in outlying districts, where the leakage of gas from the holder has plenty of space, may be very good; but in the city area, where many of the garages are low in the roof, and very often close to or under dwelling-houses, the smell from these holders would be somewhat objectionable, and very dangerous. Their usefulness is also limited to roofed vehicles. For lorry work they are not suitable.

STEEL GASHOLDERS.

The subject of steel gasholders, says Mr. Liggett, should not be approached by the gas industry as a war-time or emergency expedient, but as a further outlet for the use of coal gas and a serious competitor to electricity or petrol in the commercial life of the city. Compressed gas in steel or rigid holders is the practical solution of the problem of carrying a supply of gas for power purposes on motor vehicles. There were four principal objections to its use:

1.—*Compression.* This is the most serious item of expense, but could easily be overcome by the battery system referred to above. The gas consumed in compressing 400 c.ft. of gas, in the case under review, was about 12 c.ft., costing under a halfpenny. The railway companies had practised this method for many years by placing large cylinders of compressed gas on trucks and sending them to various stations to charge the gasholders which were fitted to the carriages.

2.—*Gas Controller.* On the motor vehicles which he had seen at several places, the gas was drawn from the flexible holder and supplied to the engine by an ordinary gas connection fitted to the induction pipe at or near the governor valve; the air supply being drawn through the carburettor in the usual way. This method was certainly simple, as gas or petrol could be used as required; but it was a great waster of gas, and did not allow the best results to be obtained from either gas or petrol. To get the best results from gas, a special controller or carburettor for gas only should be used to supply the engine with a proper explosive mixture. The special controller which was used on the gas-driven motor of the Department gave these results, combining simplicity with utility; and by the movement of a pin, gas or petrol could be used without stopping the engine. The controller was made in eight parts—the four principal being the inner sleeve, outer sleeve, air cuff, and gas cuff—and was fitted to the engine by a special connection or duct inserted between the flanges of the induction pipe and the petrol carburettor.

3.—*Governor or Reducing Valve.* This might be an objection; but it was an indispensable fitting for compressed gas, and on it the driver depended to get a regular supply of gas at low pressure—the lowest pressure being necessary for the efficient working of the engine, to drain the holders of the last foot of gas. The governor used was

TABLE OF RESULTS *of the Trials run between 400 c ft. of gas compressed to 200 lbs. per sq. inch, and a measured gallon of petrol; outward and inward trials being run at various loads. The gross weight of the vehicle is shown. Route between Glasgow and the Village of Cumbernauld. Gas costing 2s. 8d. per 1000 c.ft. (New Glasgow Price). Petrol costing 2s. 2d. per gallon.*

July, 1917.	Weight. Tons.	Cwt.	Distance (Miles). Gas.	Petrol.	Time (Minutes). Gas.	Petrol.	Per Mile. Feet. Gas.	Gills. Petrol.	Cost per Mile. Gas.	Petrol.
Gas—out	5	11	11·6	..	63	..	34·482	..	1·103d.	..
,, in.	5	11	13·6	..	65	..	29·411	..	·941d.	..
Petrol—out	5	11	..	9·3	..	53	..	3·440	..	2·795d.
,, in	5	11	..	12·0	..	70	..	2·366	..	2·166d.
Gas—out	5	0	11·1	..	65	..	36·036	..	1·153d.	..
,, in	5	0	14·2	..	63	..	28·169	..	·901d.	..
Petrol—out	5	0	..	10·0	..	47	..	3·200	..	2·500d.
,, in	5	0	..	12·6	..	65	..	2·539	..	2·062d.
Gas—out	4	10	12·4	..	63	..	32·258	..	1·032d.	..
,, in.	4	10	15·6	..	74	..	25·641	..	·820d.	..
Petrol—out	4	10	..	10·3	..	75	..	3·106	..	2·523d.
,, in.	4	10	..	12·7	..	63	..	2·519	..	2·046d.
Gas—out	4	0	13·3	..	58	..	30·075	..	·962d.	..
,, in	4	0	15·9	..	69	..	25·157	..	·805d.	..
Petrol—out	4	0	..	11·7	..	50	..	2·735	..	2·222d.
,, in.	4	0	..	12·5	..	57	..	2·540	..	2·080d.
Gas—out	3	11	13·5	..	55	..	29·629	..	·948d.	..
,, in.	3	11	16·0	..	67	..	25·000	..	·800d.	..
Petrol—out	3	11	..	11·7	..	49	..	2·735	..	2·222d.
,, in.	3	11	..	13·1	..	59	..	2·442	..	1·984d.
Gas—Total	22	12	137·2	..	642	..	29·154	..	·932d.	..
Petrol—Total	22	12	..	115·9	..	588	..	2·781	..	2·243d.

NOTE.—The unladened weight of vehicle is 3 tons 11 cwt. No hills were coasted, but all were driven down at a regular speed on brakes. No adjustments were made during trials.

TABLE OF RESULTS *by Enriching Gas with Petrol. Out Runs Only.*

—	Weight. Tons.	Cwt.	Distance Miles.	Time Minutes.	Per Mile. Feet Gas.	Gills Petrol.	Cost per Mile.
1. Blowing gas on to petrol in pressure tank	5	11	14 6	70	27,390	19	1·933d.
2. Compressing petrol with gas	5	11	12·0	67	33,333	6	1·472d.

one he had specially designed for this particular work; and it had admirably fulfilled the conditions required of it. The principal parts were the body piece, high pressure tube, low pressure tube, valve, diaphragm, balance, and socket.

4.—*Wear on Tyres due to Extra Weight Carried.* This objection would not prove very serious, when the great saving in fuel was taken into account.

In conclusion, after being satisfied that compressed coal gas for motor vehicles is a practical thing, and a good proposition for a further outlet for the sale of gas, Mr. Liggett suggests:

I.—That the Department prepare all their existing motors for gas.

II.—That two experimental cylinders, 10 in. × 4 in., capable of withstanding 1000 lbs. pressure per square inch, be obtained—one to be mounted in place of the present battery to supply the Department motors, and one to be mounted on a chassis to supply any consumer who may wish to give the system a trial. The system could afterwards be gradually extended.

III.—That pumps or compressors be got to fill these cylinders with gas up to 1000 lbs. pressure per square inch in 60 minutes.

He is convinced that if the above method is tried, good results will be obtained.

THE GAS CONTROVERSY AT CHICAGO.

Terms of Final Settlement.

The City Council of Chicago have agreed with the People's Gas Light and Coke Company as to rates and conditions of gas supply. The agreement has been arrived at after prolonged negotiations, in which the Company were represented by engineers (Messrs. Woolfolk and Chenery), and not by lawyers; and the expert acting on behalf of the city was Prof. Bemis. The contract now accepted by both parties is for one year only, but may be extended to five years by mutual consent. The Company recognize the right of the city to regulate price and quality, subject to no changes within the year, the right of contest, and the regulations of the Illinois Public Utilities Commission.

Hitherto the supply has comprised water gas manufactured by the Company, supplemented by coke-oven and natural gas purchased in bulk, to the extent of one-fourth of the total of 21,000 million c.ft. per annum. The 700,000 consumers are supplied through about 3000 miles of mains, with gas of 22-candle power and 660 B.Th.U. heating value, at a price of 80 c. per 1000 c.ft. The high quality standard necessitated the use of 8,000,000 gallons of oil per annum; and as oil was greatly advanced in price, the chief question, on the part of the Company, was the avoidance of the heavy oil bill. Matters were complicated by the fact that the city, advised by Prof. Bemis, had in 1911 fixed the price at 68 c., and talked about a refund of $10,000,000 on the strength of his recommendation.

The new calorific standard is a monthly average of 565 B.Th.U., with a minimum of 540 B.Th.U. as an average of two consecutive days; and there is to be a gradual reduction of illuminating power. For 60 days after the acceptance of the ordinance, it is not to be less than 16 candles; during the next 120 days, it must not fall below 12; and then it is to be within the limits of 9 to 11 for a whole year. The object of spreading this clause over 18 months is the protection of the flat-flame user, and to afford time for education on the advantage of substituting incandescent burners. The final stipulation indicates an attempt to secure uniformity of composition. The Company are to make four free adjustments of all gas appliances in the city within the first year, and two in each following year; and, within 60 days after the ordinance takes effect, they are to make a house-to-house canvass, and offer to all consumers entirely dependent upon, and having no other means of lighting than, flat-flame burners, two junior mantle lights free of charge, and to sell mantles at half cost to all classes of consumers. As compared with the flat flame, the junior burner used half the gas and gave more than twice as much light, and, after all reasonable allowance for maintenance, afforded a large saving.

The price schedule is based upon the quantity of gas used, together with a variable initial charge for the first 350 c.ft. used per month, or less, which also constitutes a minimum charge. After satisfying the first charge, which ranges from 30 c. for a 10-light meter, by gradual advance according to size up to $2 for a 400-light meter, less than 10,000 c.ft. will be charged at 70 c. per 1000 c.ft.; additional consumption up to 50,000, at 65 c.; and any further excess, at 40 c. The rental ledgers for recording so many different conditions will be somewhat elaborate in character. The scheme is not entirely satisfactory to either side, but is the nearest approach that seemed practicable.

The Company undertake to build a new coke-oven plant, and within three years to supply not less than 8000 million c.ft. from it. This will mean a gas that will conform to the new standards, and cost 10 c. per 1000 c.ft.—one-third of the present cost of making water gas.

Profit sharing as between the City and the Company—the employees being left out in the cold—is a condition, but only applies to excess profits. From the total income from all sources is to be deducted the normal working expenses, depreciation, reserves, taxes, 6 p.ct. on all new securities represented by property, $4,000,000 to pay interest on bonds, and 4·2 p.ct. on the present stock; of the remainder, $500,000 is to be divided between the City and the Company in the proportion of 25 : 75; and the balance is to be shared equally. The effect is that both parties share alike in all profits exceeding a 5·2 p.ct. dividend.

Camborne Gas Company.—Presiding at the annual meeting of the Company, Mr. C. Bryant said the cost of coal had increased over 50 p.ct.; but the price of gas to the consumers was only 10 p.ct. more than before the war. The Directors were anxious not to advance the price further; but, if necessary, the consumers must be prepared to bear their share of the burden. In spite of the absence of public lighting, and the restrictions in other directions, the consumption had decreased by only 2,000,000 c.ft. He hoped satisfactory arrangements would be made for at least a partial lighting of the town during the coming winter. A dividend of 4 p.ct. was declared.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 3.

The tar products prices are steady, and so far as products under Government control are concerned, there cannot be any fluctuation in values. Pitch continues in demand, but the difficulty is to find manufacturers who desire to sell further quantities at present. For export the quotation stands nominally at 45s. net f.o.b., makers' works.

Other prices are solvent naphtha 90-160 about 2s. 3d. net and naked *ex* works, anthracene 40°-50° 6d. net per unit casks free and delivered.

A fair amount of business in sulphate of ammonia is being done for home agriculture on the basis of the official prices according to time of delivery.

Tar Products in the Provinces.

Sept. 3.

Markets for tar products remain about the same. Pitch is still very firm in London and high prices are being paid.

The average values for gas-works products during the week were: Gas-works coal tar, 23s. to 27s. Pitch, East Coast, 17s. to 18s. per ton; West Coast—Manchester 17s. 6d. to 18s. 6d., Liverpool 17s. 6d. to 18s. 6d., Clyde 18s. to 19s. nominal. Benzol, 90 p.ct., London, 11½d., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6¾d. to 7¼d. Solvent naphtha, naked, London, 2s., North, 1s. 11d. to 2s. Heavy naphtha, London, 1s. 3d. to 1s. 5d., North, 1s. 1d. to 1s. 2d. Creosote, in bulk, London, 3¾d. to 4¼d., North, 3½d to 3¾d. Heavy oils, in bulk, North, 3¾d. to 4¼d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Manchester District Tar Prices.

The average price realized for tar in this district, based on the value of the products for the month of July, was 27s. 7d. per ton.

FROM A MARKET CORRESPONDENT.

Tar Products.

These products generally remain quiet and firm. The pitch position continues to improve, so far as export business is concerned; and up to 48s. per ton has been paid in London. Provincial producers find a difficulty in getting at the export trade, owing, in the first place, to the expenses of carrying northern pitch to London; secondly, to the probability that the railway companies would not be allowed to carry any large quantities; and, thirdly, to the almost impossibility of obtaining shipping facilities at provincial ports, on account of general tonnage shortage. Consequently, provincial prices do not respond as readily as London. Nevertheless, the shipping position encourages holders, who are not over-anxious to sell, and are able to refuse low offers. Continental demand is still brisk, and shipments are to be continued throughout the remainder of the summer. A little united action on the part of provincial producers would probably secure for them a portion of this trade. Benzol and toluol remain unchanged; and solvent naphtha continues a strong market. Supplies of the last-named are somewhat scarce; but quotations are still on last week's basis, although sellers are talking about getting more money in the near future. Crude naphtha is firm. On and after Oct. 1, dealing in any crude benzol, crude naphtha, or light oils containing recoverable quantities of benzol or toluol are prohibited, except under licence; and all persons engaged in the trade are required to make such returns regarding their businesses as may from time to time be asked for by the Ministry of Munitions. The effect of this order upon quotations is too early to anticipate; but it will certainly not fail to prove a handicap to business, as a similar order has done in the case of naphthalenes. Cresylic acid is no worse; the general quotation being 2s. 4d. per gallon, although Glasgow quotes 2s. Aniline oil is a shade lower. Carbolic acid (crude) remains at the fixed price; and crystals are very rarely mentioned, as the Government is taking practically the whole production. Naphthalenes, both refined and crude, are steady, and inclined to be in short supply. The range of quotations is as follows:

Aniline Oil (pure): 1s. 2d. per gallon.

Benzol: 90 % London 1s. 0½d., North 10½d. to 11½d.; 50 % North 1s. 3d. to 1s. 4d. naked per gallon.

Carbolic Acid: 60 % East and West Coast 3s. 4d. per gallon; crystals 40 %, 1s. 3d. per lb.

Crude Tar: London 28s., Midlands 23s. 6d., North 24s. per ton, *ex* works.

Pitch: London 48s. f.o.b.; East Coast 18s. to 20s. f.o.b.; West Coast—Liverpool and Manchester 18s. to 20s. f.a.s., Clyde 20s. per ton. New Season: Provinces 25s.

Solvent Naphtha: Naked London 90-190 % 1s. 7d. to 1s. 9d.; North 1s. 4d. to 1s. 6d. per gallon; 90-160 % naked London 2s. 3d. to 2s. 4d.; North 1s. 11d. to 2s. 2d. per gallon.

Crude Naphtha: Naked 30% 8½d. to 8¾d.; North 6¼d. to 6½d. per lb.

Naphthalene: Refined £25 to £30; salts 80s., bags included.

Toluol: Naked, London 2s. 3d.; North 2s. 3d.

Creosote: Nominal, London 4¼d.; North 3¾d.; heavy oil 4¼d. per lb. in bulk.

Anthracene: "A" quality, 40-45 %, 3d. per unit; "B" quality, 1¾d. to 2¼d.

Richmond's "R.H.D." Gasfire

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Cresylic Acid: 95 %, 2s. 4d.; 97-99 %, 2s. 6d.-2s. 7d., *ex* works London and f.o.b. other parts.

Grease Oils 18° Tw. (naked), £6 per ton, f.o.r. makers' works.

In America, an easy market prevails. Stocks are accumulating; while buyers hold off. The following U.S. quotations to hand by last mail may be of interest: Benzol, 2s. 3d.; toluol, 7s. per gallon; aniline oil, 1s. 3d. per lb.; pitch, from 40s. to 100s. per ton according to grade; anthracene, 80 p.ct., 5d. per lb.

Sulphate of Ammonia.

There is little fresh news coming to hand regarding sulphate. Very few shipping licences are being issued; and the exports for last month will show very small quantities when the trade returns are forthcoming in a few days' time. The home demand at the present time is easily accounting for home supplies. Production has, of course, greatly increased of late, and is still increasing; but, fortunately, the British farmer is gradually learning the many advantages of sulphate as a fertilizer, and is buying fairly freely. His trade is, without doubt, one to be cultivated and developed, as only by this means will the manufacturer be able to face the loss after the war of a large portion of his export trade, which will be the result of the present restrictions. Concerted publicity and educational propaganda—for which there has previously been entered a plea in these reports—would go a long way towards producing the desired results after the war. At present business is decidedly good; the low quotation till the end of this month attracting many orders. Next month the price will be £15 17s. 6d. to £6 per ton; so that activity should continue and possibly increase as the month progresses. In America, apart from contract business, sulphate is practically off the market; the only offers being confined to a few tons of surplus material held by consumers who satisfied their probable requirements earlier in the year. Never before has there been such a scarcity; and prices have reached the equivalent of £29 per ton —an almost unheard-of figure. This is, however, merely a passing phase, as in a few months America is likely to have an exportable balance, which, should Japan not have made good by home production her loss of imports from this country, will be readily saleable there.

Quotations (basis 25 p.ct., double bags): Home trade: September, £15 7s. 6d.; October-December, £15 17s. 6d. to £6 January-May, £16 7s. 6d.—all delivered; 10s. less at makers' works.

Export (under licence only): London, Liverpool, Leith, and Hull, £23 10s. to £24 f.o.b.

At Keighley last Friday, the use of high-pressure gas for motor lorries commenced; a wagon receiving a charge of 450 c.ft. It was calculated that this supply would carry a 25 H.P. vehicle weighing 2 tons a distance of 20 miles. As to relative costs, it is assumed that 250 c.ft. of gas at 2s. 4d. per 1000 c.ft. equals in driving power a gallon of petrol at 3s. 8d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is rather firmer for prompt delivery; but for forward, the tone of the market is somewhat uncertain. The home demand is generally good, but the export trade is restricted by the insufficient arrivals of steamers. In the steam coal branch, best kinds are firm. Northumbrians are 30s. per ton f.o.b.; second-class steams are 25s. 6d. per ton; and steam smalls are plentiful at from 18s. 6d. to 20s. per ton. Work is a little brisker at the collieries; but idle time is still frequent in some parts. In the gas coal trade, the steady increase in consumption continues; and there is now a desire to stock more freely. For best Durham gas coals, 25s. per ton is now the f.o.b. quotation; second-class gas coals are 23s. 6d. per ton; and "Wear specials" are firm at 28s. to 30s. per ton f.o.b. There is some scarcity of the best gas coals; but secondary kinds are fairly abundant. Freights on gas coals to London are a little higher—about 16s. being now the current rate; and to the neutral ports they are relatively higher. The large consumption of coking coal seems to be stiffening Durham coal prices generally. The production of gas coke is increasing; but the output is well taken up. Good gas coke is 29s. to 31s. per ton f.o.b. A demand for France seems heavier, with high freights.

Purifier Destroyed at Salisbury.—An oxide of iron purifying box, 25 ft. square, at the Salisbury Gas-Works was destroyed by an explosion on Monday of last week, when it had been partly emptied. Fortunately, no workmen were engaged in the building at the time. The resulting fire was promptly dealt with by members of the staff, under the direction of Mr. W. Fielden (the Engineer and Manager); but the services of the volunteer fire brigade were also requisitioned. Effective measures were adopted to prevent any spread of the fire to three other boxes through which gas was passing at the time, and also to one of the smaller gasholders in the near vicinity which was deflated. The cause of the explosion remains a mystery.

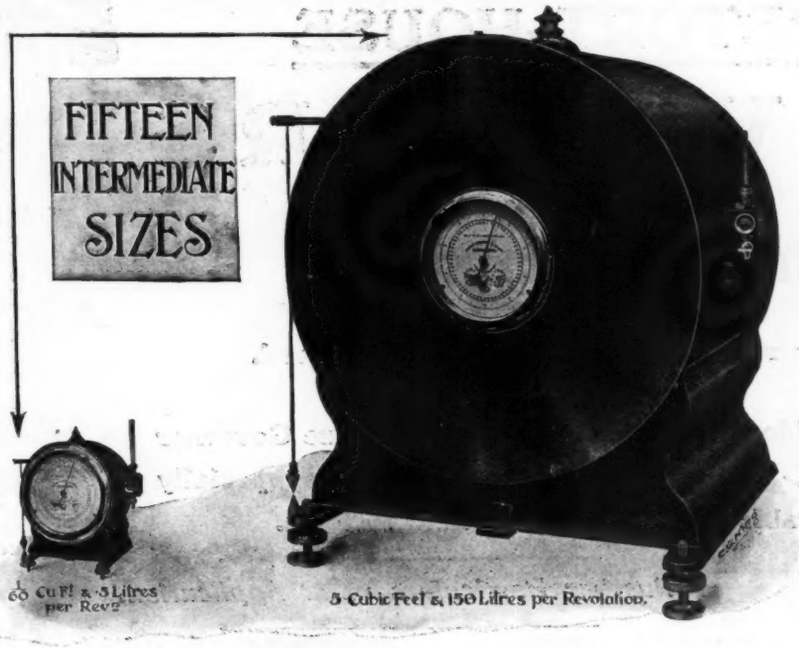
NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

Laboratory Meters



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Northwich Gas Company.

The half-yearly meeting of the Company was held on the 27th ult. Mr. C. T. Eachus (the Chairman) presided, and, in presenting the statement of accounts for the half year ended June 30, complimented the shareholders on the good results attained, especially having regard to the very high cost of raw materials and increases in wages. He said that, after careful consideration, the Directors had decided to recommend that an interim dividend be declared at the rate of 4 p.ct. per annum on the preference shares (free of income-tax), and 4 p.ct. per annum on the ordinary stock (less income-tax). The report was adopted, and the dividend agreed to.

Chester United Gas Company.

Moving the adoption of the report and statement of accounts at the recent meeting of the Company, the Chairman (Alderman J. M. Frost) said the general result of the six months' operations had been satisfactory, and had resulted in a balance of gross profit of £6055, which was nearly £150 in excess of the profit earned in the corresponding period of last year. After providing for payment of £569 interest on debenture stock and £1050 dividend on preference stock, and payment of interest on temporary loans, there remained a net balance of £4317. The dividend recommended would absorb £3929, leaving a balance of £388 to carry forward, subject to a small balance of income-tax still to be paid. Considering the very trying times and the excessive rise in the price of all materials, they should be highly pleased with these results, more particularly so as they were obtained with an increase in the price of gas of only 5d. per 1000 c.ft., as compared with pre-war prices. Coals had cost nearly £1600 more. This was attributable to an increased quantity of 1100 tons being used, and a small rise in the price, and also in the cost of carting. The cost of works repairs had been rather heavier; but this was due to increased cost of materials. The manufacturing plant had been thoroughly overhauled, and was in very good working order, under the supervision of the new Engineer (Mr. J. H. Noble), who had proved himself to be thoroughly efficient and capable. The benzol recovery process had been in operation since the beginning of March, and had yielded results satisfactory to the Ministry of Munitions. It afforded a reasonable profit; and the Directors hoped that they would have recouped the cost within four or five years. Now that they had had experience with the working of the plant, they found no difficulty in supplying gas up to and above the standard of 500 B.Th.U., fixed by the Board of Trade. The report was adopted, and a dividend of 2½ p.ct. for the half year was declared.

At a meeting of the Inverness Gas Committee, it was stated that it was necessary to increase the cost of gas from Nov. 15 by 10d. per 1000 c.ft. The Provost thought an increase of 6d. would be sufficient; but the decision for the higher rate was carried.

Condemned Gas Mantles.

At the Mansion House Police Court, last Thursday, before the Lord Mayor, Adolf Knopf, trading under the style of the Wholesale Guarantee Incandescent Supply Stores, Waterloo Road, S.E., was summoned to show cause why three cases of incandescent gas mantles, imported in 1915, should not be condemned. The proceedings had been adjourned to enable the defendant to produce evidence from Holland to show that the goods were not of enemy origin. It was now stated that every possible endeavour had been made to secure the attendance of the necessary witnesses; but they were afraid to take the risk of the voyage. It was suggested on behalf of the defendant that the matter should stand over till the end of the war. For the Customs Authorities, Mr. Hubbard said the goods were imported in December, 1915, and were, in the first instance, seized under the Merchandise Marks Act. An examination by experts proved conclusively that the mantles were of German manufacture. The defendant, a naturalized Austrian, did not claim ownership. The loss of the goods would fall on the agent in Holland. The Lord Mayor made the order asked for, with £5 5s. costs.

Johnstone Corporation Gas Accounts.

Mr. James Dickson, the Engineer and Manager, has presented to the Corporation of Johnstone his report on the working of the gas undertaking for the year ended May 15. In it he says that all difficulties have been overcome in a satisfactory manner, due in large measure to improved methods and the ready co-operation of workers of all grades. The quantity of gas sold was 92,829,400 c.ft., as compared with 92,841,000 c.ft. in the previous year—a very small decrease, having regard to the lighting restrictions and the operation of the Summer Time Act. The proportion of gas unaccounted for was 6·25 p.ct. of the make. The income was £21,376, or £2300 more; and the expenditure, £15,834, as compared with £15,073. There is thus a credit balance of £5541, as against £4002. The working-up of tar into its first and second distillates, and selling the refined tar for road making, has turned out a most excellent scheme on the first full year's working. The net income from tar is £1715. Present distillers' prices for crude tar approximate 11s. 6d. per 100 gallons; and by selling the whole year's output of tar on the old lines, an income of £765 would have been secured. The net gain is thus £950, which, added to the results of the part of last year in which the plant was in operation, already wipes out fully three-fourths of the entire capital outlay. The prospects for the current year are favourable, considering all circumstances. Coal has been bought at 19s. 2d. per ton, or 7d. less than last year's contract price; and carbonizing results show still further improvement. The gas sales meantime promise a large increase on that of the year just ended. Refined tar and creosote prices are considerably better than at this time last year; and benzol remains firm. It has been decided, in view of the good working results, and the prospects of the current year, to continue the price of gas at 2s. 10d. per 1000 c.ft. (2s. 9d. to all consumers using 100,000 c.ft. per annum per meter).

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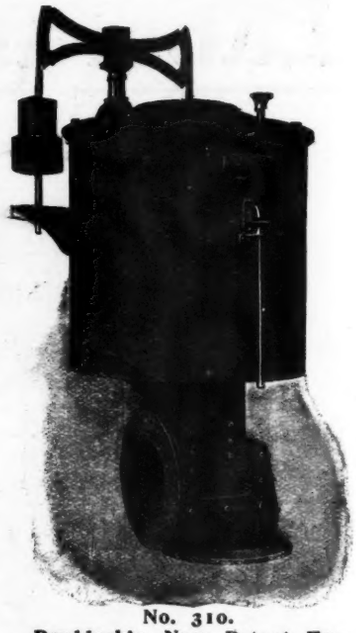

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Eastbourne Gas Company's Results.

It was stated at the meeting of the Company, over which Mr. J. C. Towner presided, that, despite the enhanced charges, the half-year's accounts showed increased sales of gas to the extent of 12¾ million c.ft., or 5 p.ct., as compared with the same period of the previous year. There had been a growth of 99 in the number of consumers, who now totalled 11,643. Among the anxieties had been the labour question. The military needs had had to come first; and the Works Manager (Mr. W. H. Hammond) had found the greatest difficulty in handling so many thousands of tons of coal and materials at the works. It was to be expected, too, that the increased cost of living would express itself in the wages account. Applications from the men had been most carefully weighed; and increases had been granted by way of enhanced wages, and also war bonuses. The Directors believed that a contented employee was the best worker, and had honestly endeavoured to deal fairly with all. The labour bill had been heavy; but the cost of coal and gas oil, with all other materials, had been appalling. Sea freights had been the principal cause. The Company had used 21,739 tons of coal, at an increased cost per ton of 5s. 8d., as compared with a year ago. The gas oil used had increased in cost from 2·48d. to 8·38d. per gallon. These two items amounted to an additional expenditure for the half year of £8857. In face of these figures, only an increase in the charges for gas could meet the situation—a course which had been followed with the greatest regret. The revenue account showed a profit for the six months of £7129; and a sum of £751 had been transferred from the reserve fund to the profit and loss account. Dividends were declared for the half year at the rate of £6 8s. 9d. p.ct. per annum on the "A" stock, £4 18s. 9d. p.ct. per annum on the "B" stock, and 5 p.ct. on the preference stock. Replying to a vote of thanks to the staff and workmen, the Secretary (Mr. J. S. Garrard) referred to the fact that so many of the men are co-partners in the concern, through the scheme launched three years ago.

Consumption of Gas at Bishop's Stortford.—It was stated at the meeting last week of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company that for the past half year, as compared with the corresponding period of last year, the sale of gas showed a reduction of 1,032,600 c.ft., or 1·78 p.ct.; but as a result of the advance in price made at the beginning of the half year, the gas-rental had increased by £560. The cost of coal and oil carbonized had risen by the large sum of £1234, owing to the increased charges the Company had had to pay. This further enhanced cost of producing gas represented a serious addition to the expenditure on revenue account, which the improvement in the receipts was insufficient to meet. After charging interest, a balance of profit of £2715 is placed to the credit of the profit and loss account. An amount of £3027 is available for distribution Dividends were declared at the statutory rates, leaving £99 to the credit of the profit and loss account.

Gloucester Gas Company.—The report adopted at the half-yearly meeting of the Company (over which Sir Richard V. Vassar-Smith, Bart., presided) stated that there had been a good increase in the sale of gas; and the revenue from residuals was also larger. A dividend for the six months was declared at the rate of 5 p.ct. per annum, less income-tax, upon the consolidated stock. The Chairman referred to the fact that the Secretary (Mr. W. E. Vinson, F.I.C.) had passed fifty years in the service of the Company; and he complimented Mr. Vinson on this fact.

Loss on the Sidmouth Gas Undertaking.—It was reported at a meeting of the Sidmouth Urban District Council on Friday that the Gas Committee had asked the Finance Committee to provide for a contribution of £500 to the gas undertaking during the ensuing half year. The Chairman (Mr. Halse) said this was the second application of the kind by the Gas Committee. Last year was the worst the gas undertaking had experienced. He did not think the loss would be anything like so bad this year, because they had paid off the last of the short loans, and the consumption had increased in the past two months. During the four years that the Council had owned the works, they had repaid loans to the amount of £4369. They were debarred from increasing the price of gas beyond 4s. 6d. per 1000 c.ft., which was only 6d. more than the late Gas Company charged under much more favourable circumstances. It was a question whether they ought not to have gone in for a Provisional Order giving the Council power to increase the price. He hoped, however, the undertaking would soon be on a more sound financial basis. Other members expressed confidence in the opinion that the gas-works would be an ultimate source of profit to the ratepayers.

Brighton and Hove General Gas Company.—An increase of nearly 12 p.ct. in the sales of gas during the past half year will be reported at the meeting of the Company next Friday. The expenditure upon coal, oil, &c., has risen from £61,801 to £107,367, an increase of £45,566. Approximately 90 p.ct. of this addition to the cost of manufacture is due to the increase in the charges the Company have been called upon to pay for freight. Carbonizing wages, war allowances to employees to meet the extra cost of food, &c., and maintenance allowances to dependants of employees serving with the forces together show the large increase of £3220. To meet in some degree these abnormal charges, the Directors have been compelled to raise the price of gas 4d. per 1000 c.ft. as from July 1. By the terms of the sliding-scale, the rates of the dividends payable for the half year ending Dec. 31 next, will be further reduced by 1 p.ct. per annum—on the original ordinary stock from 10 to 9 p.ct., and on the "A" ordinary stock from 7 to 6 p.ct. per annum The profits for the half year amount to £18,977, to which is added £38,727 brought forward, giving a total of £57,704. A sum of £52,788 is available; and the Directors recommend the declaration of dividends at the statutory rates. This appropriation will require £20,984, and leave a balance of £31,803 to be carried to the credit of the profit and loss account for the current half year.

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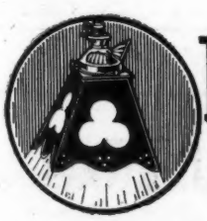
G. 4.

M. S.



Podmore's Protector

G. 7.

G. 5.

K Burners,
K Mantles,
Glass,
etc., etc.

RENEWALS for ALL Lucas Lamp Parts.

Shipley Gas Charges.—As a result of the recent allegations in public that the Shipley gas charges have been unduly and inexplicably heavy, the Gas Committee have been making inquiries, and have satisfied themselves that the records of the meters have been correctly taken and the accounts rendered in accordance with the register. In some cases, the consumption seemed to be exceptionally heavy, and special inquiries would be necessary. The Clerk has been instructed to prepare for submission to the next meeting a report as to these cases.

Manchester Shopkeepers Want More Gas.—The Manchester and District Retail Traders' Association are urging upon the Gas Committee the desirability of their having an extra hour's consumption during the winter months for shop-window illumination; and at a recent meeting of the Gas Committee, it was resolved that the Chief Constable be notified that the Committee were desirous of considering the question of street lighting next winter, and would be glad to have his views having regard to the results of the visits to various towns some time ago. At present, however, the Committee state that they hold out no hope of any improvement in either respect. Considering the number of motor-car fatalities which occurred in Manchester last winter owing to the too-darkened thoroughfares, a modification of the lighting arrangements certainly appears desirable.

Barnsley Gas Company.—The Chairman (Mr. E. G. Lancaster), moving the adoption of the report and balance-sheet at the annual meeting of the Barnsley Gas Company, said that the Directors were again able to place before the shareholders a satisfactory balance-sheet. The profit had amounted to £7342, compared with £7494 for the previous year. Their sales of gas were practically stationary; and this was not an unfavourable result, in view of the restricted hours for lighting. A revolution had taken place in regard to the hours of consumption of gas. Formerly the biggest consumption was at night, up to 11 and 12 o'clock; but now the heaviest draw came on between 12 noon and 2.30 p.m. An aspect not quite so pleasing was the necessity for repairs. They were in a colliery district, where the ground was always more or less on the move, and constant breakages in the mains and services occurred. Their leakage had been between 11 and 12 p.ct., instead of a normal rate of 5 to 6 p.ct.; and if they could save this 5 p.ct., it would be nearly all clear profit. They could, unlike many other gas companies, take credit for not having increased the price of gas. The report and balance-sheet were adopted; and it was agreed to increase the allowances to the Directors by £150, and to pay a bonus of 10 p.ct. on the salaries and wages of the staff.

Damage which is roughly estimated at £5000 was done to the premises of the Parkland Manufacturing Company, Bingley, by a fire which broke out on Friday morning. The office portion was entirely gutted; and as these and other parts of the works were electrically lighted, the fusing of an electrical connection is thought to have been the cause.

The Scottish Motor Traction Company, of Edinburgh, who have at present several of their buses equipped with flexible gas-containers, are to extend this method of obtaining power to other buses on routes running 22 miles out and home. They have departed from the usual plan of passing the gas through the carburettor, and have made the connection to the engine through the induction-pipe; but this makes no difference to the fuel control. A new and improved gas-container is on the market, made by a British firm of rubber manufacturers. These are gas, air, and water tight, and are quickly and easily fitted.

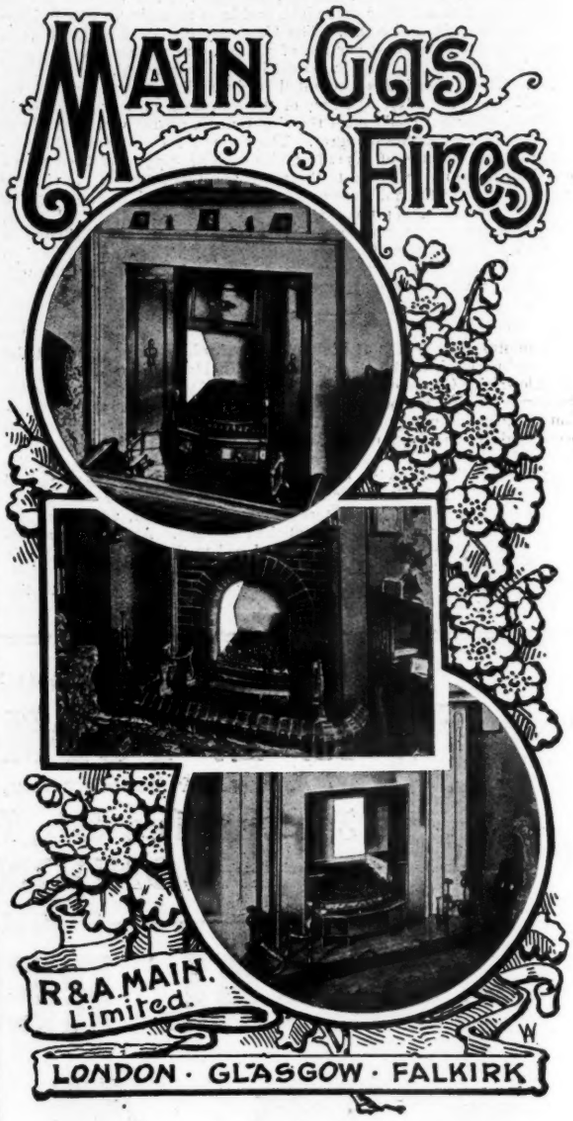
APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 29.]

Nos. 11,896—12,236.

ALDRIDGE, J. G. W.—"Charging-machines for gas-retorts, &c." No. 12,190.
BOWDEN WIRE, LTD.—"Bunsen burners." No. 12,178.
BURNS, H. A.—"Separating suspended particles from gaseous bodies." No. 12,055.
CALLENDER, L.—"Using compressed or condensed gas to drive internal-combustion engines." No. 11,957.
CLARK, F. W.—"Gas manufacture." No. 12,042.
COLLINS, F. E.—"Utilization of compressed gas as fuel for engines, &c." No. 12,161.
COMPAGNIE DES FORGES D'AUDINCOURT ET DEPENDANCES.—"Calorimetric meters." Nos. 12,102, 12,103.
COX, D. S.—"Trailer gas-fuel container for motor-vehicles." No. 11,961.
DAVIES, P.—See Bowden Wire. No. 12,178.
DEBAISIEUX, E. L.—"Gas stoves or radiators, &c." No. 11,916.
GIBBONS BROS.—See Clark. No. 12,042.
GUILLEMIN, A.—See Compagnie des Forges. Nos. 12,102, 12,103.
HARGER, J.—"Utilization and combustion of fuel." No. 12,044.
HELPS, G.—"Gas manufacture, &c." No. 12,043.
HELPS, G.—See Harger. No. 12,044.
HENNESSY, J. J.—"Stopping from outside punctured holes in gas, water, &c., vessels." No. 12,027.
JONES, S.—"Vertical retorts." No. 12,134.
LEWIS, W. I. G.—"Gas-heaters." No. 12,135.
MACDONALD, J. D.—See Jones. No. 12,134.
MCLELLAN, T.—"Stopping holes in pipes, &c." No. 11,984.
OTTINO, G. P.—"Storing coal gas, &c., for motor-vehicles." No. 12,151.
RAMUZ, O.—"Mechanical high-pressure compressors." No. 12,171.
SHERWOOD, F.—"Gas cooking-stoves." No. 12,081.
SIMPSON, J. E.—"Incandescent gas-mantles." No. 11,962.
SOUTHEY, A. W.—"Gasifying liquid hydrocarbons." No. 12,108.
SVENSKA AKTIEBOLAGET GASACCUMULATOR.—"Automatically exchanging incandescent bodies in an incandescent gas-light arrangement." No. 12,073.
TOWNSEND, W. W.—"Intermittent vertical retorts." No. 12,089.
WARD, W. A.—"Making mantle rings or supports." No. 12,091.

MAIN'S NEW FOLDER IS READY.



Supplies of this handy List will be sent upon application. It contains the latest information and prices of the popular "Main" Fires, Radiators, &c.

Place your Season's Orders early.

We have commenced our deliveries.

R. & A. MAIN, Ltd.,

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W.; 82, Gordon Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 3, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Meters, Fires, and Cookers at Salford.—According to the minutes of the Salford Gas Committee to be submitted to the Town Council to-morrow (Wednesday), at the monthly meeting, a report will be presented from the Finance Committee as to the acceptance of new loans (of which the following is a summary) and to adopt a resolution thereon: Gas-works, £2625; meters, fires, and cookers, £20,900.

Proposed Advance in Price at Rochdale.—At the monthly meeting of the Rochdale Town Council on Thursday, the Gas Committee will ask for confirmation of a decision arrived at last Friday to increase the price of gas 4d. per 1000 c.ft. for all purposes. The present charge is 3s. for lighting; and for heating or power, the prices have ranged from 2s. 8d. to 2s., according to the quantity consumed. The last increase in price took place in June, 1915, when an advance of 6d. per 1000 c.ft. for lighting and 8d. for cooking was made. The 3s. 4d. per 1000 c.ft. now proposed is the highest charge made for gas at Rochdale since 1882-4, when the price was 3s. 6d. The surplus on last year's working of the gas undertaking was not sufficient by £2258 to meet the annual allocation of £6000 to the renewals fund. War bonuses, &c., granted to employees since June last are estimated to cost £2600 more than budgeted for; and an extra £700 is required for the cartage of coal, or a total of £5558. The increase of 4d. on the present prices will yield an extra revenue of about £5350.

Coal Gas for Motor Traction at Leeds.—The Leeds Corporation Gas Committee are arranging to instal plant at several of their works and gasholder stations for filling the reservoirs that have for some time been carried experimentally by a number of motor vehicles. The price of gas for this purpose has been fixed at 4d. per 100 c.ft.; so that to fill a reservoir such as is carried on a van with a 16 to 20 H.P. engine will cost about 1s.

Romford Gas and Coke Company, Ltd.—The report adopted at the recent meeting of the Company stated that the revenue profit for the half year ended June 30 carried to profit and loss account was £3736; and adding £5 for interest on mains laid on undeveloped estates, there was a gross profit of £3741. With the balance brought forward there was an available total of £7696. After providing for interest on the reserve and insurance funds, debenture bonds, consumers' deposits, and loan from bankers, there remained a net balance of £6929. Out of this sum, the Directors recommended that dividends of 6¾ p.ct. on the original shares, and 4¾ p.ct. on the "B" shares, both less income-tax, be declared for the half year, leaving £4041 to be carried forward. The sale of gas showed an increase of 13·81 p.ct. over the corresponding half of 1916. It was with regret that the Directors announced the death in April last of their colleague Mr. W. D. Child, who had served the Company for the period of forty years.

STOCK MARKET REPORT.

The general position of affairs on the Stock Exchange took a favourable turn last week, in the form of a welcome access of activity to a degree which could hardly be looked for in the last week of August. But, as in the preceding week, this phenomenon was to be found most abundant in the Miscellaneous group, especially in industrial and kindred undertakings. The prevailing tone, though subject to some counter-tendencies at times, was on the whole stronger, particularly at the close. Towards this, the war news from all the Western Fronts was a contributary factor, though Russian news was still a damping set-off. There is plenty of money about, the results of trade profits; and the possessors are growing more emboldened to speculate on peace prospects.

The gilt-edged market was not at its best; and Home Government issues had a cold fit for some time, but hardened before the close. Colonial and Indian were stronger. In Home Rails, dulness was the general feature, though Undergrounds rose in response to the advance in fares. The American Market was dull, and Canadians participated, though the Government Bill to acquire the Northern line had passed the House. Argentines were better.

Among the Miscellaneous, Rubber was firm and Oil fair. Much attraction was found in Explosives, Nitrates, and Iron and Steel.

Business in the Gas Market would have been below a fair average in point of aggregate bargains, but for renewed activity in Primitivas, which were plentifully dealt in at prices better than last week's advanced figures. Apart from these, the general tone was quite satisfactory. By far the greater number of changes in quotation were *ex div* variations in which the turn was favourable; but among the rest Gas Light ordinary and maximum and the three Sheffields made advances. On Thursday and Friday, some bargains were marked in the new South Metropolitan preference stock issue.

In the Money Market there was a good demand at first, but conditions eased materially later.

Bargains done for cash during the week were as follows: On Monday, Brentford "B" 76, Brighton and Hove "A" 103½, 104, Commercial debenture 52, 52¼, Gas Light ordinary 71, 71¼, Imperial Continental 80¾, 80½, Oriental 105, Portsea "C" 76, 76½, Primitiva 46s., 46s. 6d., ditto preference 66s. 3d., 67s. 6d., South Metropolitan debenture 56. On Tuesday, Cape Town debenture 61, 61⅛, Commercial 4 p.ct. 74, European 11, Gas Light ordinary 70½, 70⅝, ditto maximum 57, ditto preference 71⅛, 72, Imperial Continental 80½, Oriental 105½, Primitiva 45s. 3d., 46s., 46s. 6d., 47s., 47s. 6d., ditto preference 65s., South African 8½, Southampton 75, 75½, 76. On Wednesday, Gas Light ordinary 70½, Imperial Continental 81, 81½, Primitiva 46s. 3d., 46s. 9d., 47s., 47s. 3d., 47s. 6d., ditto preference 65s., 66s. 10½d., ditto debenture 79. On Thursday, Commercial 4 p.ct. 73¼, 73⅜, Gas Light maximum 57⅛, ditto debenture 56⅜, 56½, Imperial Continental 81, 81½, Primitiva 45s., 46s. 3d., 47s. 3d., South Metropolitan 72½, ditto debenture 56¼, ditto 5 p.ct. preference 94¼, 94½, Southampton 75¾. On Friday, Gas Light ordinary 70⅛, 70⅜, 71, 71⅜, ditto preference 71¾, ditto debenture 56¼, Imperial Continental 81⅜, 83, Primitiva 45s., ditto preference 62s. 6d., South Metropolitan 5 p.ct. preference 94½.

The Bank rate is 5 p.ct., as fixed on April 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	57—62	..
1,551,868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	60—65	..
374,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	57—62	..
280,000	5	April 29	7½	4/6	Bombay, Ltd.	57—62	4⅜—5⅜	..
50,000	10	Feb. 26	16	14%	Bourne-mouth Gas and Water { 10 p.c.	22—30	23—25*	..
388,115	10		7	7%	B 7 p.c.	15—15½	10¼—11*	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	9—9½*	..
159,740	—	—	—	4%	4 p.c. Deb.	..	69—71	..
992,045	Stk.	Feb. 26	14	5¼%	Brentford A Consolid.	261—266	79—82	..
784,920	,,	,,	11	4⅛%	Do. B New	204—209	76—79	76
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	81—86	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	65—67	..
217,380	,,	Feb. 26	11	10%	Brighton & Hove Orig.	208—213	150—155	..
244,200	,,	,,	8	7%	Do. A Ord. Stk.	154—159	102—107	103½—104
530,000	20	Mar. 26	12½	22/6	British	44—45	33—34	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—56	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	2⅜—3½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	6¾—7¾	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—65	61—61⅜
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	78—79*	..
1,513,380	,,	Feb. 12	5/9/4	44/-	Commercial 4 p.c. Stk.	106—108	70—72*	73½—74
560,000	,,	,,	5⅓	40/-	Do. 3½ p.c. do.	103—105	64—66*	..
475,000	,,	June 11	3	3⅜%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53	52—52½
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	39—41	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	61—63	..
278,400	—	—	—	11½%	Croydon B and C 7 p.c.	..	165—175*	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	123—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	11—12	11
16,313,480	Stk.	Feb. 10	4/17/4	37/4	Gas Light and Coke { 4 p.c. Ord.	98—102	70—72	70½—71⅛
2,600,000	,,	,,	3⅛	3⅛%	3½ p.c. max.	76—79	56—58	57—57½
4,062,285	,,	,,	4	4%	4 p.c. Con. Pref.	96—99	70—72	71⅜—72
4,674,850	,,	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	55—57	56½—56⅝
180,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	4½%	Hastings & St. L. 3½ p.c.	87—89	59—55	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16¾	7½—8½	..
26,600	—	—	—	9½%	Hornsey 7 p.c.	..	130—130	..
181,000	Stk.	Mar. 12	7½	7½%	Ilford A and C.	151—154	95—100	..
65,780	,,	,,	6⅜	5¼%	Do. B	115—118	75—80	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	65—68	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	79—84	80½—83
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	62—65	..
295,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	85—90	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A	211—213	81—82*	..
					{ B	146—148		
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	70—72	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4½—4¾	3¾—4	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	88—96	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	8—8½	..
1,875,892	Stk.	July 29	4½	4½%	Newcastle&Gatsh'dCon.	98½—99½	70—71	70½—71½
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	61—63	..
55,940	10	Feb. 26	7/14/0	7/-	North Middlesex 7 p.c.	14—15	10—11	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	80½—83
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	..
60,000	50	Feb. 26	13	12½%	Portsea, Island B	128—131	83—86*	..
100,000	50	,,	12	11%	Do. C	118—121	73—78*	76—76½
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	2⅞—3·7	45/—47/6
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅝—5	3⅜—3⅝	65/—67/6
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	76—80	79
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	59—64	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7⅛—8½	..
125,000	50	July 1	5	5%	{ 5 p.c. Deb.	47—49	40—43	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—234	..	..
209,984	,,	,,	10	10%	Do. B	223—234	182—186	..
538,500	,,	,,	10	10%	Do. C	230—232	..	..
90,000	10	May 28	9	6/-	South African	10½—11½	8½—9½	8½
6,609,895	Stk.	Feb. 10	5/4/0	46/8	South Met. 4 p.c. Ord.	111—113	71—72*	72½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	73½—74½	55—57	56—56½
224,820	,,	Feb. 26	8½	7½%	South Shields Con. Stk.	157—159	137—139*	..
952,796	,,	,,	6	4⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	74—76	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—77	..
135,000	—	—	—	4½%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	86—88	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	76—78	75—76
120,000	,,	Feb. 12	7½	5½%	Tottenham District { A 5 p.c.	135—138	92—97*	..
782,375	,,	,,	6	4%	{ B 3½ p.c.	115—117	66—71*	..
181,255	,,	June 26	4	4%	{ 4 p.c. Deb.	87—89	63—65	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—109½	89—91	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 26	8⅜	72/6	Wandsworth A 5 p.c.	151—156	112—117*	..
255,536	,,	,,	6⅜	57/6	Do. B 3½ p.c.	129—134	97—99*	..
108,075	,,	,,	5/17/8	50/9	Do. C 3⅜ p.c.	110—115	84—89*	..
352,000	,,	,,	6⅜	51/8	Wimbledon 5 p.c.	117—122	85—90*	..
98,000	,,	,,	6⅜	57/6	Epsom 5 p.c.	121—126	93—98*	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	50—53	..

* Ex. Div.

An outbreak of fire on Saturday night in Cumberland Street, Pimlico, resulted in the death of an elderly woman, whose clothing became ignited at a gas-stove.

At the half-yearly general meeting of the British Gas Light Company, Ltd., to be held this month, the Directors propose to recommend, subject to audit, a dividend at the rate of 10 p.ct. per annum, with a bonus of 2s. 6d. per share, for the six months ended June 30 last, both less income-tax, and payable in October.

The British Westinghouse Electric and Manufacturing Company, Ltd., of Trafford Park, Manchester, forward a copy of the statement of receipts and payments on account of their employees' war relief fund, from Aug. 22, 1914, to June 30, 1917. Of the total sum of £43,093 contributed, £29,102 has been given by the employees and £13,990 by the Company. Out of this amount, £25,835 has been paid to dependants, £11,678 has been set aside for a disablement and dependants' fund, and over £2080 has been spent in donations to local and national funds, &c. The number of families in receipt of relief is 718; and 2702 employees have joined the forces.

The Scotch Shale Miners' Association state that negotiations have been completed for the Government to at once release shale miners from the Army to return to the mines. The plans of the Government for increased production are on a large scale; and it has been decided to add greatly to the man-power of the Scottish shale mines.

It was reported at a meeting of the Shipley District Council last Tuesday that the Finance Committee had been visited by Mr. W. Brindley, of the Coal Controller's Department, who put forward the Controller's proposal that local authorities should arrange with merchants for sufficient coal to be available during the winter for the use of the poor people who cannot afford to stock now. It was pointed out to Mr. Brindley that the Shipley Gas Department have already entered into an agreement for the purchase of 1000 tons of coal which was suitable for domestic use, but which was intended for the production of gas in the event of the ordinary gas coal being short. If this coal were not required for gas, it would be available for the public. Mr. Brindley asked if the coal could not be definitely set aside for the public; but the reply was that it would depend upon the requirements of the gas-works.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

STOKERS. No. 6346.
RESIDENT ENGINEER AND MANAGER. Annfield Plain Gas Company. Applications by Sept. 10, to 50, Cannon Street, E.C. 4.
CHEMIST. No. 6336, 6344, 6345, 6348.
FOREMAN. No. 6350.
WORKING MANAGER. No. 6349
WORKING MANAGER. Mildenhall Gas Company.

Appointments Wanted.

ACCOUNTANT, CASHIER, OR SECRETARY. No. 6343.
WORKING GAS MANAGER. No. 6340.
CHEMIST. No. 6348.

Plant, &c. (Second Hand), for Sale.

BOILERS AND TANKS. Stanley Engineering Company, Bath.
PIPES. T. C. Jones & Co., Shepherd's Bush.

Plant Required.

SUCTION GAS PRODUCER PLANTS. No. 6339.

Tank Wagon Wanted to Hire.—No. 6347.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

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